

# Annex E - Yatta Assessment Report

سلطة المياه الفلسطينية  
PALESTINIAN WATER AUTHORITY



## Yatta Water Supply Project (YWSP)

### Phase 1

LRPS-2021-9164656

## Technical Assessment Report

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## Terms of Reference – Assessment Report

### 7.2 Field Assessment, Feasibility Report and Presentation

This report shall contain the detailed assessment and with the background data and pictures (visual information) in the Annex, following UNICEF approval of the inception report, workplan and methodologies. The report shall clearly describe the works and their status, of the parts which was already completed, was not completed, was old but needs to be incorporated and the part which is still missing. The institutional set-up and functioning of the O&M routines will also need to be decried in detail, as well as the set-up to develop the capacity of the utility to handle the O&M after completion of the whole project, including the financial sustainability of the service.



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## Abbreviations

BoQs	Bill of Quantities
DWG	Drawings
GR	Growth Rate
ha	hectare
IDF	Intensity Duration Frequency
ILC	International Law Commission
IR	Inception Report
LM	Linear Meter
MEHE	Ministry of Education and Higher Education
MoA	Ministry of Agriculture
MoH	Ministry of Health
MoLG	Ministry of Local Government
NGO	Non-Governmental Organization
NIS	New Israeli Shekel
O&M	Operation and Maintenance
PCBS	Palestinian Central Bureau of Statistics
PNA	Palestinian National Authority
PRDP	Palestinian Reform and Development Plan
PSI	Palestinian Standard Institute
PRVs	Pressure Reducing Valves
PWA	Palestinian Water Authority
SoP	State of Palestine
ToR	Terms of References
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
UG	Universal Group for Engineering and Consulting
UNRWA	United Nations Relief and Work Agency
WASH	Water and Sanitation Hygiene
WBWD	West Bank Water Department
WHO	World Health Organization
WSSPS	Water Sector Strategic Planning Study
YWSD	Yatta Water Supply Department
YWSP	Yatta Water Supply System Project

# 1. INTRODUCTION

## 1.1 BACKGROUND

Palestine faces major issues and a great challenge towards the access and distribution of water throughout its territories. The West Bank suffers from water shortages, which affect directly the population served, but also indirectly the Palestinian economic development. Therefore, children in the State of Palestine (SoP), their families and communities require significant investments in the sustainability and maintenance of Water and Sanitation Hygiene (WASH) infrastructure for their needs to be addressed over the long-term.

Improving the water supply and distribution, in addition to the wastewater collection has positive impact on public health and quality of life for the communities in Palestine and wellbeing of children, as well as in promoting further commercial and industrial growth.

Few years ago, Yatta Water Supply System Project (YWSP) was implemented under the fund of USAID, but it was not completed.

The constructed YWSP consists of:

- (a) completed, but not assessed, works,
- (b) non-completed works,
- (c) supplied equipment and fittings but not tested, and
- (d) not-supplied works and equipment's.

At the time YWSP was halted, it had progressed to about 80% completion. The project components, as planned for in 2019, were:

**Three New Reservoirs/tanks** with all related mechanical, electrical and instrumentational components:

1. KHALLET SALEEM Reservoir, at grade 5,000 cubic meters' capacity.
2. Schools Reservoir, at Grade 1000 cubic meters' capacity.
3. Beit Emra Reservoir, elevated 500 cubic meters' capacity.

**New Transmission and Distribution Pipelines:**

- Construction of new main supply and distribution pipelines, from the reservoirs to the new distribution network/pipes, with an approximate total length of 21 km, using steel pipes of 150 mm, 200 mm, 250 mm and 300 mm.
- Construction of new distribution network/pipes and replacement and upsizing of the old network/pipes, with an approximate total length of 40 km, using steel pipes with sizes of 50 mm, 75 mm, 100 mm and 150 mm.

**SCADA Monitoring system including, according to the Contract, the following items:**

- Addition of specified control hardware and software. Input-Output (I/O) point connections.
- Wiring and wiring devices.
- Field instruments.
- Communication system and programming
- Training of WBWD/PWA and Yatta municipality staff on the Operation and Maintenance (O&M) of the system and its components.

## 1.2 PURPOSE OF THE ASSESSMENT

In light of the consultancy assignment, a detailed assessment was carried out to assess the conditions and functionality of the installed main transmission pipelines, distribution water networks, water pipes, chambers, reservoirs including valves and spare part, etc. It also included the institutional conditions and organization of the YWSD in place which is covered under a separate report (Institutional Organization and Capacity Assessment).

The field assessment included reviewing and verifying the available data, investigating and testing (sample testing, spot checks, verification), collecting, reviewing and analyzing the field data, develop a sound basis for the evaluation of the project conditions and status, to draw the subsequent conclusions and provide the relevant recommendations.

The consulting staff assessed all elements associated with the USAID implemented project in Yatta. The assessments included the conditions and state of the completed works and installed fittings and equipment. The non-completed works were identified and assessed with due considerations to the fittings and equipment that were supplied to the Municipality warehouse.

The Consultant prepared and preformed a comprehensive testing (sample testing, spot checks, verification) system to assure the quality of the completed works and the supplied fittings.

The assessment included the followings:

- (1) Field visits and meetings with stakeholders and partners.
- (2) Physical inspection, testing (sample testing, spot checks, verification) and the assessment of the completed works. The condition and the status were determined for any rehabilitation or adjustment needed, as well as testing (sample testing, spot checks, verification). The components to make sure that the completed works adhere to the international standards. All needed testing (sample testing, spot checks, verification) according to the TOR to assure the quality of the works were conducted.
- (3) Physical inspection and testing (sample testing, spot checks, verification) for the installed fittings and equipment. The inspection determined the condition and quality of these fittings and gave an indication for their suitability for the project.
- (4) Investigation for the supplied fittings and equipment at the municipality and PWA stores, which were not yet used. The investigation included the assessment of the condition and quality of these fittings and gave an indication for their suitability for the project operable.
- (5) Assessment of the non-completed works and the determination of any changes to the design and layout of the works.
- (6) Testing (sample testing, spot checks, verification) of the installed water pipelines, fittings and accessories of various sizes.
- (7) Testing (sample testing, spot checks, verification) of existing asphalt reinstatement.
- (8) Testing (sample testing, spot checks, verification) for 24 partially completed reinforced concrete cast-in-place chambers, and 104 partially completed pre-cast reinforced concrete chambers
- (9) Testing (sample testing, spot checks, verification) of the partially completed civil and concrete works at the 1,000 m<sup>3</sup> Schools Reservoir, 5,000 m<sup>3</sup> Khalet Saleem Reservoir, and 500 m<sup>3</sup> Beit Emra Reservoir and identification of the remaining works.
- (10) Review of all the materials and spare parts handed over to PWA by USAID during the handover, with particular attention to the electromechanical components.
- (11) Assess any works done, by a third party, from the stoppage period up to now.

### 1.3 OBJECTIVES OF THE ASSESSMENT

The main objectives of the assessment tasks are to assess the completed and non-completed works under the project and to propose an efficient methodology and workplan to complete all project components as planned.

The main expected objectives/ outputs of the assessment are:

- 1) Determine the quality of the works implemented.
- 2) Evaluate the impact of the stoppage period on the project components.
- 3) Identification of the remaining works (non-completed works).
- 4) Determine any additional rehabilitation or adjustment needed.
- 5) Determination of any changes to the design and layout of the works in order to reflect that on the tender documents.
- 6) Identification of any new fittings and equipment needed for the project to be able to complete the project and operate it as planned.
- 7) Determine the quantity, quality and condition of the supplied fittings and equipment at the municipality and PWA stores for the project.
- 8) Evaluate the impact of any works done, by a third party on the project components.

All the outputs and recommendation coming from the assessment study will be considered in the preliminary design report as well as the tender documents in phase 2.

### 1.4 LIST OF TASKS UNDER ACTIVITY 2: ASSESSMENT REPORT

**Table 1** lists the activities of the consultancy assignment; tasks and sub tasks and the related output as per the TOR. For sub task 2.9, it is covered under a separate report (Institutional Organization and Capacity Assessment).

**Table 1. List of Activities and Tasks under the Activity 2: Assessment Report**

Activates/Tasks	Sub Task	Activities
Activity 2: Assessments and reporting including Surveys and testing and revision of the existing As-built drawings	2.1	Field Investigation: interviews, field visits and meetings with stakeholders and partners to assess the requirement and collect data, including the set-up for and the capacity to manage O&M of the institution itself.
	2.2	Prepare and preform a comprehensive testing (sample testing, spot checks, verification) system to assure the quality of the completed works, partially completed and the supplied fittings.
	2.3	Physical inspection, testing (sample testing, spot checks, verification) and the assessment of: <ul style="list-style-type: none"> <li>- completed works,</li> <li>- installed fittings and equipment, and</li> <li>- supplied fittings and equipment at the municipality store.</li> </ul>
	2.4	Assessment of the non-completed works and the determination of any changes to the design and layouts of the works.
	2.5	Assessment and Identification of any new fittings and equipment needed for the project to be able to complete the project and operate it as planned.
	2.6	Testing (sample testing, spot checks, verification) and assessment of: <ul style="list-style-type: none"> <li>- installed water pipelines, fittings and accessories of various sizes.</li> <li>- Existing asphalt reinstatement.</li> <li>- partially completed reinforced concrete cast-in-place chambers and partially completed pre-cast reinforced concrete chambers.</li> <li>- Civil and concrete works at the 1,000 m<sup>3</sup> Schools Reservoir, 5,000 m<sup>3</sup> Khalet Saleem Reservoir, and 500 m<sup>3</sup> Beit Emra Reservoir and identification of the remaining works.</li> </ul>
	2.7	Review of all the materials and spare parts handed over to PWA by USAID during the handover, with particular attention to the electromechanical components.
	2.8	Assess any works done, by a third party (or Yatta Municipality), from the stoppage time up to now and evaluate its impact on the project components.
	2.9	Assess all required O&M procedures and activities set-up (planned), the existing O&M arrangement and condition in practice, equipment and use of chemicals, the recording and reporting, and the management capacity including cost recovery (installing a sustainable tariff, collection efficiency) to ensure the financial sustainability, and the software to deal with O&M timely and with quality including SCADA.
	2.10	Overall Assessment Report with conclusions and recommendations.

## 2. SAMPLING AND TESTING PLAN

As part of the assessment required for the non-completed works, several sampling and tests were done in order to have an understanding of the conditions of the non-completed works.

**Table 2** summarize the testing and investigation plan which were conducted under activity 2.

**Table 2. Testing and Investigation Plan (non-completed works)**

#	Description	Unit	No.	Specifications	Testing and Sampling Dates
1	Sample testing of installed water pipes - 1 km.	LS	1	According to PWA specifications	17 <sup>th</sup> and 18 <sup>th</sup> of August 2021
2	Sample testing of existing base course and bedding material.	No.	10	According to PWA specifications	3 <sup>rd</sup> and 4 <sup>th</sup> of August 2021
3	Asphalt test for roads and trenches to ensure same thickness and degree of compaction as part of reinstatement along the transmission pipeline and distribution network.	No.	30	According to PWA specifications	3 <sup>rd</sup> , 4 <sup>th</sup> , 10 <sup>th</sup> and 11 <sup>th</sup> of August 2021
4	Core tests for 10 out of 24 partially completed reinforced concrete cast-in-place chambers and 20 out of 104 partially completed pre-cast reinforced concrete chambers.	No.	30	According to PWA specifications	3 <sup>rd</sup> , 4 <sup>th</sup> , 10 <sup>th</sup> and 11 <sup>th</sup> of August 2021
5	Tightness test for Beit Amra Reservoir only	LS	1	According to PWA specifications	12 <sup>th</sup> to- 30 <sup>th</sup> of August 2021
6	Visual assessment of the 3 reservoirs.	No.	3	-	3 <sup>rd</sup> , 4 <sup>th</sup> , 10 <sup>th</sup> and 11 <sup>th</sup> of August 2021
7	Visual assessment of the chambers	No.	128	-	3 <sup>rd</sup> , 4 <sup>th</sup> , 10 <sup>th</sup> and 11 <sup>th</sup> of August 2021
8	Review of all the materials and spare parts handed over to PWA by USAID during the handover, with particular attention to the electromechanical components.	LS	1	-	27 <sup>th</sup> and 28 <sup>th</sup> of July 2021
9	Assess works done, by a third party (or Yatta Municipality), from the stoppage time up to now and evaluate its impact on the project components.	LS	1	-	25 <sup>th</sup> and 26 <sup>th</sup> of July 2021

The samples were sent to a certified laboratory for testing in accordance with PWA specifications and PSI.

### 3. CONDITION ASSESSMENT

#### 3.1 REVIEW OF ALL THE MATERIALS AND SPARE PARTS HANDED OVER TO PWA

##### 3.1.1 General

After the suspension of the project activities in 2019, all the materials, valves, equipment and instrumentations were handed over to PWA. Since that, they are stored in a warehouse in Yatta under the control of PWA. The list provided includes 649 different materials.

The Consultant has prepared a checklist listing and identifying all the materials within the framework of YWSP. The materials are classified based on the type, use and conditions.

As part of the consultancy assignment, the Consultant reviewed all the materials and spare parts handed over to PWA by USAID during the handover of YWSP, with particular attention to the electromechanical components. The checklist includes the followings descriptions checked and verified. After the physical inspection, the Consultant identified the need/use of each material, identified the damaged and the not-supplied materials in order to include them in the next stage.

The consultant prepared an assessment matrix check list. The check list was applied for all the materials. Table (3) shows the content of the assessment matrix check list.

**Table 3. Materials and spare parts assessment matrix checklist**

No.	Item Description	Brand/Model/ Model #/ Manufacturer	Brand/Model/ Model #/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used (Yes, No)	Comments
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The materials and equipment's were stored in two locations. The first location is a closed storehouse which includes the materials that can be affected by weather conditions such as electrical materials, electromagnetic Flow Meters, SCADA equipment's etc. Figure (1) shows a general view of the closed storehouse. Most of the materials were stored on the ground inside boxes.



**Figure 1: Materials Storage area No.1**

The second location is an open space storage area. The main material stored are steel pipes, valves, manhole covers, elbows etc. Most of the materials were stored directly on the ground. Figure 2 shows a general view of the open space storehouse.



**Figure 2: Materials Storage area No.2**

The materials in the closed storage are subject to humidity and internal heat as the ventilation is minimum. The materials in the open storage are subject to weather conditions of rain and sunshine. Both materials have to be cleansed from dust and dirt and tested before being installed.

### 3.1.2 Method of Inspection

All the materials in both storehouses were visually inspected. The material checklist was used for each item and sub item. The inspection covered the quantities, type and conditions for each material. All observations were listed.

The materials and spare parts handed over to PWA by USAID during the handover can be classified into two different categories: Non completed Works and spare parts materials. The filled material checklist is presented in Appendix 1.

The spare part materials were assessed into Good, Fair (need some cleaning or repair) or bad. They shall remain under the project assets until the end of the defect liability period of the project completion after the implementation.

### 3.1.3 Summary of Observations

Below is a summary of the observations made in relation to the condition of the materials:

- 1) All materials are high quality original brands.
- 2) Most of the main materials which are related to the remaining project components are in good conditions. This statement covers the valves, SCADA components, Pipes and electrical equipment's.
- 3) Most of the materials with bad conditions are the secondary and supplementary materials. These are geotextile, water stop, elbows, bends, tees etc.
- 4) Except for the Electromagnetic Flow Meter, the materials were not tagged with special code or number.
- 5) Around 20% of the steel pipes have cracks in the internal cement lining. These pipes shall not be used in the project. these are observed in the 3 Inch, 4 Inch, 6 Inch and 8 Inch Pipes. This will not have impact on the project as most of the works related to those diameters are completed and these are from the spare parts.
- 6) All materials which have validity dates are expired. These materials are concrete additives and concrete repair materials such as Rendroc FC, Nitocote EPSW, Nito Marter etc.

- 7) The pipe quantities are less than the list of materials provided by PWA. Mainly, the missing pipes are from 4-inch and 3-inch pipes. However, those missing pipes are from the spare parts material list. It might have been used for other activities by YM or PWA.
- 8) All electrical valves and equipment have unused batteries inside. These needs to be replaced.
- 9) All materials (except the SCADA components) are full in dirt and dust. However, this does not have any direct impact on the materials.
- 10) The current condition of the open space storehouse is very bad. Except for the pipes and manhole covers. The materials are badly stored. see self-explanatory photos.



- 11) Gaskets were stored in normal weather conditions for more than three to four years. There are some risks in using them.
- 12) The Steel Pipe are SCH40 pipes. In addition, the valves, Gaskets, bolts are American Standard. But compatible.
- 13) The non-completed works and the spare parts materials were stored together without any type of marking or proper storage mechanism but can be distinguished.
- 14) In Appendix 1. All cells colored in light green are in good conditions and can be used without any problems. The materials which are in bad conditions and shall not be sued are market in light orange. The light-yellow cells are for the materials which the consultant did not manage to find and inspected inside the storage houses.

### 3.1.4 Recommendations

1. A detailed storage management plan shall be prepared. This shall cover the storage area, location, condition, tag system, material Input and output mechanism before implementation. This shall also include separation between
2. General cleaning for all materials from dust and dirt.
3. Sand Blasting shall be used to clean all the rusts on the flanges. This shall be added in the BOQ of the completion project.
4. Remove all the damaged materials which will not be used such as water stop, geotextile, shrinkable sheets, shrinkable tapes, reinforced steel etc. and as indicated in the list presented in Appendix 1.
5. Add items in the BOQ of the completion project such as epoxy painting for the steel pipes, cement lining repair etc.
6. Additional supply of pipes and its fittings and coupling will be needed. This depends on the discussions with the project stakeholder as we have to install 2-inch and 1-inch coupling with 5-6 meter pipes every 18m for future connections. In total we will need additional 10,000 m of pipes.

- All steel pipes which have cracks in the cement lining shall not be used.

### 3.1.5 Conclusions

The materials in the storage appear to be in a good condition and can be used to complete the project components, as long as maintenance and repairs are performed in addition to consider the recommendations mentioned in the previous section. The damaged material can be replaced and supplied from the local market without any problems.

As a conclusion, the risks coming from the materials handed over to PWA after the stoppage of the project are minimal and shall not have any significant impact during the completion of the project or during operation.

### 3.1.6 PHOTOS

Sample photos during the inspection are presented below with comments.



Brand Electromagnetic Flow Meter in very good conditions.



Brand Gate Valves in very good conditions.



Flanges need cleaning using sand blasting



Steel Pipes. The pipes with cracks in the cement lining must be excluded, less than 20%



Expired admixture materials.



Damaged Water Stop. Has nothing to do with the remaining works.



Brand Electromagnetic Flow Meter in very good condition.



Brand Gate Valves in very good condition.



Bends and Elbows need cleaning and insulation. The damaged ones have to be excluded.



Rusted Reinforced Steel shall not be used in the project.



SCADA equipment are in Good Conditions.



Manholes are in good Conditions



Handrails for Reservoir in bad condition but can be used



Pipes in bad conditions



PRV in Good Conditions.



Will need some repair and insulation before use



Electrical Poles are in Good Conditions.



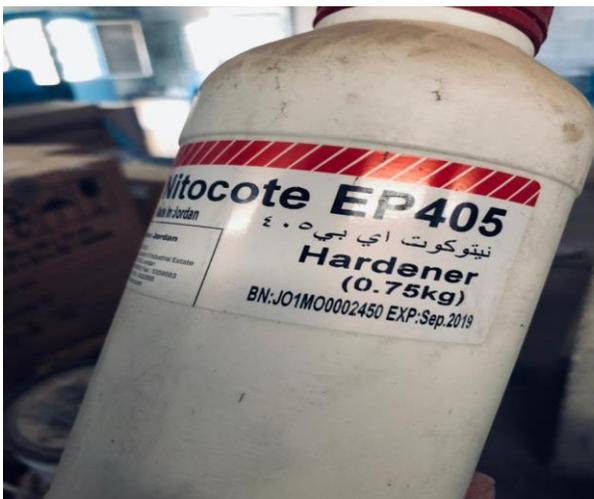
Geotextile in bad conditions



Tags are only on the EM flow Meters



More Valves stored in un-appropriate way



More Expired admixture materials.



Cleaning is required

## 3.2 ASPHALT TEST FOR ROADS AND TRENCHES

### 3.2.1 General

Asphalt reinstatement is a main component in the remaining works under YWSP. There are significant sections which were left without reinstatement and other sections have only one layer of asphalt.

The reinstatement works in the BoQs of the original project were presented in several methods of measurements. The non-completed works include: Reinstatement works with two layers of asphalt for different trench widths. Only one layer was completed for around 18,500 m. The second layer for these has to be completed in addition to 28,800 m of reinstatement with two asphalt layers.

One of the concerns were the condition of the implemented asphalt reinstatement. Asphalt core test was done to check the thickness and degree of compaction for the reinstated sections (asphalted). 30 different asphalt core samples were taken at different sections and locations.

### 3.2.2 Method of Sampling and Testing

The testing samples were randomly selected in term of general locations to have representative results. However, the specific locations of the tests were selected on site to reflect the actual condition of the area. The 30 sample were distributed along the implemented pipes (68 km).

Asphalt core sample of 4-inch diameters were extracted using a core machine with water cooled diamond tip core cutter. The asphalt cores were sent to the laboratory to measure the degree of compaction.

The standards are ASTM-2726 and AASHTO 230.

The procedures and method of taking the core sample were:

- Selected cores location by the consultant team.
- Safety equipment's were used to secure the test location from traffic
- Place the core machine on the top of the asphalt layer with a proper leveling jack
- Start lowering the core bit slowly with water circulation to cool the core bit, until we reach the full depth of the asphalt layer.
- Raise up the core bit. Pick up an undamaged core from each of the locations.
- Label the cores and measure the asphalt thickness.
- Transport the core samples to the certified laboratory. Use extreme caution in handling cores during transport. The core sample was then tested in the laboratory for degree of compaction.
- A plate of Asphalt was taken for the comparison.

### 3.2.3 Summary of observations and results

Below is a summary of the observations made in relation to the condition of the asphalt reinstatement as well as the results of the asphalt tests results. The laboratory results for the asphalt core tests are presented in Appendix 2.

The following results and observations were noticed:

- 1) The degree of Compaction for the 30 sample were ranging between 97% and 99.7%. These arranges are acceptable if we take into consideration that only one layer of asphalt reinstatement was implemented.
- 2) The thickness of the 30 asphalt samples were ranging between 4 cm and 11.1 cm. 6 samples were less than 5 cm which shall be the minimum for the first layer of asphalt reinstatement. The additional layer has to be implemented in order to have a minimum of 10 cm thickness for both asphalt layers.
- 3) The asphalt reinstatement condition is bad and must be supported with one additional layer. Figure 3 shows some locations which will need a second layer of asphalt reinstatement.



**Figure 3. Current Reinstatement Condition in Yatta**

### 3.2.4 Recommendation and Conclusions

Based on the results of the asphalt core test, the asphalt reinstatement shall be tackled case by case. Some sections will need a second layer. Other sections will need milling for the full width of the road and to add a new asphalt layer. All these will be designed and considered in the tender documents of the completion project.

In all cases, the thickness of the second layer of asphalt shall be at least 6.0 cm.

In term of Quantities, additional 25,000 m<sup>2</sup> of asphalt reinstatement is required. As a percentage, this quantity is around 17.8 % in relation to the original quantity in B.O.Q. The final decision will depend on the stakeholders and the available budget.

### 3.2.5 PHOTOS

Sample photos during the inspection are presented below with comments.



Core Test for Asphalt #1 – Taking Samples



Core Test for Asphalt #1 – 4.40 cm



Core Test for Asphalt #10 – Taking Samples



Core Test for Asphalt #10 – 7.10 cm



Core Test for Asphalt #30 – Taking Samples



Core Test for Asphalt #30 – 8.20 cm

### 3.3 CORE TEST FOR CONCRETE CHAMBERS

#### 3.3.1 General

Core test is commonly required in the area of concrete industry to evaluate the concrete strength. Sometimes it becomes the unique tool for safety assessment of existing concrete structures. The compressive strength of concrete is a direct requisite of all concrete structures that need to resist applied forces of whatever nature. Actually, the concrete compressive strength is a good index of other properties of practical significance. On the other hand, determination of the actual strength of concrete in a structure can give an indication of history of curing and the adequacy of compaction of concrete.

The determination of cube strength is the most common and simple approach for evaluating the concrete strength during the construction; however, the absence of cube results or the doubt on the results may raise a critical situation. From general prospective, core test is ultimately needed to assess one or a combination of the following:

1. The quality of the concrete provided to construction (potential strength).
2. The quality of the concrete in the construction (in-situ strength), known as actual strength.
3. The ultimate capacity of the structure to carry the imposed loads and actual loads
4. The deterioration in a structure due to overloading and fatigue.

During the visual inspection, it was noticed that most of the chambers are in good conditions. The testing sample was randomly selected for the applicable chambers to cover 10 out of 24 partially completed reinforced concrete cast-in-place chambers and 20 out of 104 partially completed pre-cast reinforced concrete chambers.

Several problems and obstacles were encountered. These problems are:

- Most of the manholes does not have internal steps.
- Most of the manholes are full of dirt's and water.
- Some manholes which are equipped with valves are too small to allow the core machine to take the sample.

Finally, the consultant managed to take the required samples in accordance with the TOR.

#### 3.3.2 Method of Sampling and Testing

Concrete core sample of 4-inch diameters were extracted using a core machine with water cooled diamond tip core cutter. The concrete cores were sent to the laboratory for compressive strength.

The standards are PS55.

The procedures and method of taking the core sample were:

- Selected manholes by the consultant based on the TOR criteria.
- Safety equipment were used to secure the test location from traffic
- Mark out the selected core location in a way that is not to have impact on the chamber.
- Measure the distance for setting upstand.
- Place the core machine on the side wall of the chamber with a proper leveling jack

- Start the core bit slowly with water circulation to cool the core bit, until we reach the full width of the chamber wall.
- Label the cores.
- The core sample was then sent to the laboratory for compressive strength.

### 3.3.3 Summary of observations and results

The walls, slab and floor of the chambers were observed to be generally in good condition. Our team did not observe any serious cracks or deviations.

The results of the tested samples were very good and proves that the concrete chambers are very strong. The compressive strength results were ranging between 460.5 kg/cm<sup>2</sup> and 583 kg/cm<sup>2</sup>. All the 30 tested samples results are much more than the minimum accepted compressive strength for chambers which is 300 kg/cm<sup>2</sup>.

Appendix 3 lists the lab test results for the 30 tested samples.

### 3.3.4 Recommendation and Conclusions

Based on the tests results, the concrete chambers are in a very good conditions in term of strength and can be used to complete the project components. Minor maintenance and repairs are required to be performed in addition to consider cleaning of the chambers.

**As a conclusion, the potential risks coming from the concrete strength of the 24 partially completed reinforced concrete cast-in-place chambers and the 104 partially completed pre-cast reinforced concrete chambers are null.**

### 3.3.5 PHOTOS



Core Test for Concrete Chamber #1



Core Sample # 1



Core Test for Concrete Chamber #5



Core Sample # 5



Core Test for Concrete Chamber #22 – preparation before taking sample



Some manholes were full of mud and water



More manholes were full of mud and water



Core Test for Concrete Chamber #26

## 3.4 SAMPLE TESTING OF INSTALLED WATER PIPES

### 3.4.1 General

In 2019 and before the stoppage of the works, only 10% of the installed pipes were subject to pressure test. This can have a major impact on the type of works to be tendered if a significant % of the pipes failed in the pressure test. According to PWA specifications and the international standard, the pipelines of the transmission and water distribution system and all the joints shall be tested by the Contractor applying a test pressure.

The pressure test component can have a serious impact and potential risks on the operation of the water network.

### 3.4.2 Method of statement

As of the PWA specifications, there are two methods that can be used for Hydrostatic Pressure Test for Steel Pipes

#### Method 1

The pipe line shall be tested on 1.5 the working pressure. In our case it will be test on 12 bars since the working pressure is between 8 bar for the tested pipe lines.

The pipeline will be maintained under the test pressure for a period of 24 hours:

- If during this period the pressure dropped below 75% of the test pressure, the test pressure will be considered as a failure.
- The test shall be deemed to be satisfactory if the pipeline holds after the initial 24 hours the specified pressure (restored pressure) for a final period of not less than two hours with a loss not exceeding 5% of the total test pressure during the two-hour period.
- No pumping shall be permitted during this final test period.

#### Method 2

Second method for hydrostatic pressure test based on ANSI/AWWA C600 specifications.

- Test pressure will not be less than 1.25 times the working pressure at the highest point along the test section. In our case it will be 12 bars.
- Test pressure will not exceed pipe or thrust-restraint design pressures.
- Hydrostatic test duration shall be at least for 2-hours.
- Test pressure shall not vary by more  $\pm 5$  psi (34.5 kPa = 0.34 Bar) for the duration of the test.

#### Testing Allowance:

No pipe installation will be accepted if the amount of makeup water is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{715317}$$

Where:

L = testing allowance (makeup water), in liters per hour

S = length of pipe tested, in meters

D = nominal diameter of the pipe, in millimeters  
P = average test pressure during the hydrostatic test, in kPa

This formula is based on a testing allowance of (1.079 L/d/km/mm) of nominal diameter at a pressure of 150 psi (1034) kPa.

**Acceptance:**

Testing allowance at various pressures are given in the table below

Avg. Test Pressure kPa **	Nominal Pipe Diameter-mm																		
	76	102	152	203	254	305	356	406	457	508	610	762	914	1,067	1,219	1,400	1,500	1,600	
3,000	1.84	2.30	3.45	4.59	5.74	6.89	8.04	9.19	10.34	11.49	13.78	17.23	20.67	22.97	27.57	32.16	34.46	36.75	
2,800	1.76	2.22	3.33	4.44	5.55	6.66	7.77	8.88	9.99	11.1	13.32	16.64	19.97	22.19	26.63	31.07	33.29	35.51	
2,600	1.71	2.14	3.21	4.28	5.35	6.42	7.48	8.55	9.62	10.69	12.83	16.04	19.25	21.39	25.66	29.94	32.08	34.22	
2,400	1.64	2.05	3.08	4.11	5.14	6.16	7.19	8.22	9.25	10.27	12.33	15.41	18.49	20.55	24.66	28.76	30.82	32.87	
2,200	1.57	1.97	2.95	3.93	4.92	5.9	6.88	7.87	8.85	9.84	11.8	14.75	17.70	19.67	23.61	27.54	29.51	31.47	
2,000	1.50	1.88	2.81	3.75	4.69	5.63	6.56	7.50	8.44	9.38	11.25	14.07	16.88	18.76	22.51	26.26	28.13	30.01	
1,800	1.42	1.78	2.67	3.56	4.45	5.34	6.23	7.12	8.01	8.90	10.68	13.35	16.01	17.79	21.35	24.91	26.69	28.47	
1,600	1.34	1.68	2.52	3.36	4.19	5.03	5.87	6.71	7.55	8.39	10.07	12.58	15.10	16.78	20.13	23.49	25.16	26.84	
1,400	1.26	1.57	2.35	3.14	3.92	4.71	5.49	6.28	7.06	7.85	9.42	11.77	14.12	15.69	18.83	21.97	23.54	25.11	
1,200	1.16	1.45	2.18	2.91	3.63	4.36	5.08	5.81	6.54	7.26	8.72	10.90	13.08	14.53	17.43	20.34	21.79	23.25	
1,000	1.06	1.33	1.99	2.65	3.32	3.98	4.64	5.30	5.97	6.63	7.96	9.95	11.94	13.26	15.91	18.57	19.89	21.22	
8,00	0.95	1.19	1.78	2.37	2.97	3.56	4.15	4.74	5.34	5.93	7.12	8.90	10.68	11.86	14.23	16.61	17.79	18.98	
6,00	0.82	1.03	1.54	2.05	2.57	3.08	3.6	4.11	4.62	5.14	6.16	7.70	9.25	10.27	12.33	14.38	15.41	16.44	

\* if the pipe line under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size  
\* 100 kPa=1 Bar

Method 2 was selected for the pressure test.

**3.4.3 Summary of observations and results**

Below is a summary of the observations made in relation to pressure test results and the pipe installation methods:

- 1) The Consultant checked the pipe installation method. It was noted that the pipes were installed based on the best international standard and the best Engineering practice. This includes the materials (Steel Pipes, elbows, etc.), the welding method, welding method of inspection, welding materials, and insulation.
- 2) The results of the 10% tested pipes in 2019 were satisfactory. All the 10% were satisfactory and passed the pressure test.
- 3) Three pipes were selected for the pressure test. **The table (4) lists** the characteristic of the tested pipes as well as the pressure test results. The results of the pressure test give us a good indication of the installed pipes.
- 4) The pipe which failed the pressure test is not sealed. Additional work is required before doing the pressure test.

**Table 4. Pressure Test results**

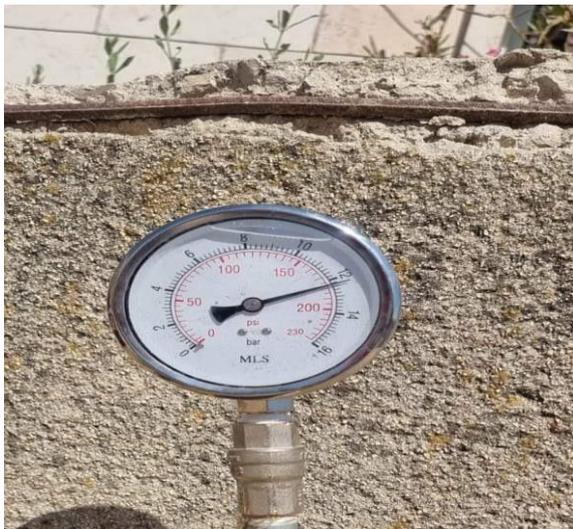
No.	Pipe Diameter (Inch)	Length (m)	Working pressure (Bar)	Pressure test (Bar)	Pressure reading after the end of the test (Bar)	Drop in pressure (Bar)	Result (Pass/Fail)	Comments
1	2 Inch	530	8.2	12.1	11.90	0.2	Pass	-
2	2 Inch	480	8.0	12.0	11.90	0.1	Pass	-
3	2 Inch	200	NA	NA	NA	NA	Fail	The Pipe did not reach the pressure required. This means that the pipe is not sealed.

### 3.4.4 Recommendation and Conclusions

Although the results of the hydrostatic pressure test for steel pipes test are satisfactory, but the Tender Document of the completion project shall have items to make pressure tests for all the installed pipes. Special conditions and BOQ items shall be considered in order to mitigate all the possible risks coming from the not tested steel pipes.

For the pipe line which fail the pressure test, this can give us indication that the Contractor shall first completed the works, connect the chambers and flanges then perform the pressure test.

### 3.4.5 PHOTOS



Pressure Test No. 1: 12.1 bar reading once pressurized



Pressure Test No. 1: 11.9 bar. reading after the pressure test.



Pressure Test No. 2: 12.0 bar reading once pressurized



Pressure Test No. 1: 11.9 bar. reading after the pressure test.



Preparations for the pressure test



### 3.5 TESTING OF EXISTING BASE COURSE AND BEDDING MATERIAL

#### 3.5.1 General

The purpose of testing and inspecting the existing basecourse and bedding material is to identify the impact of the project stoppage on the backfilling materials. This can be checked only for non-asphalted trenches as well as the reservoir sites.

The backfilling material which were used during the implementation was basecourse compacted in layers. This is the most common backfill material in Palestine. The basecourse material was tested in 2019. The results were checked and found to be good and satisfactory.

The bedding material which was used during the implementation was single size (somsom). This bedding materials is very good for steel pipes as it can protect the pipes and reduce the settlements in the above layers.

### 3.5.2 Method of Sampling and Testing

The testing procedures were done in accordance with the Palestinian Standard for testing and PWA specifications.

#### A. Basecourse Material

The testing samples were selected randomly. Three samples were taken from the yards of the existing reservoirs and the rest were taken from different locations along the existing pipe works. The field density test is a field control test for the compaction. The Field Density test by the Sand Cone Method was carried out in accordance with ASTM D1556.

#### B. Bedding Material

The testing samples were selected randomly. The trenches were excavated using an excavator to reach the bedding materials. The thickness of bedding material layers was checked in addition to visual inspection of the single size.

The results and samples of the bedding material were checked and tested in the lab. The results are presented in Appendix 4.

### 3.5.3 Summary of observations and results

The observations made in relation to bedding and basecourse materials test results:

- 1) Bedding materials in the tested locations were found to be clean and comply with the minimum width and layer thickness at 6 locations.
- 2) Basecourse materials were found to be clean and comply with the minimum width and layer thickness and well compacted at the 6 locations.
- 3) Additional compaction and cleaning for the top layer of the basecourses is required. This shall be done prior doing the asphalt reinstatement.
- 4) The basecourse layers and final levels at the three reservoir sites are incomplete. Additional layer of basecourse is required to reach the final levels before doing the asphalt works.
- 5) The bedding and basecourse materials sources were checked. Both materials comply with PWA specifications and international standards.
- 6) The basecourse material are found to be Class B according to PWA specifications which are used under structures, slabs and pavements in layers 200 mm thickness (measured before compaction), and compacted to 100% according to AASHTO T191, T180 or ASTM D 1557, ASTM D 1556 or equivalent.
- 7) Two results were found to be 95.1% and 95.4%. These two results are acceptable.
- 8) Three results were found to be 96.3%, 100.1%, 100%. These results are good and acceptable.
- 9) Two additional samples were taken and tested against max dry density  $\text{gm}^3/\text{cm}$ . both were found to be complying with the standards.

### 3.5.4 Recommendation and Conclusions

According to the tests results, the basecourse material and bedding materials appear to be in good conditions in term of compaction, type of material and thickness of layers. Before asphaltting the reinstatement, additional compaction for the basecourse are required.

**The potential risks from the basecourse and bedding materials are very minimal. It has no impact on the function and the lifetime of the pipes. Additional compaction before reinstatement shall enhance the compaction and reduce the risks.**

### 3.5.5 PHOTOS



## 3.6 TIGHTNESS TEST FOR BEIT AMMRA RESERVOIR

### 3.6.1 General

The purpose of the tightness test for Beit Ammra reservoir is to check the potential of defects that can lead to leakage in the water tank body, joints etc.

According to the TOR, the consultant shall do the tightness test for Beit Ammra. Yatta City and the surrounding areas are suffering from water shortage. The water shortage is even worse in summer season.

The consultant discovered during the preparation for the tightness test that the tank is not connected to the main network. Accordingly, the only way to fill the tank was to get the water from private tankers. This took longer time as the tanker must bring the water from 10 km far from the location of the tank. This increased significantly the price of water 2.5 times the normal price. In addition, the time for filling the tank took more than expected.

Finally, the tank was filled with 500m<sup>3</sup> of drinking water and the test was successfully completed.

### 3.6.2 Method of Sampling and Testing

The testing of tanks or water containment structures shall confirm to the standards, as applicable to the project and as modified herein: Reinforced concrete water retaining structures-ACI 350 IR and as specified herein. The test was done in accordance with the PWA Specifications.

❖ For the preparation, the following was done:

- 1) The tank was cleaned of dirt, mud and construction debris prior to initiating water tightness tests. The walls, floors and sumps were flushed with water to provide a clean surface, ready for testing.
- 2) Outlet and washout pipes were sealed.
- 3) Filling the water tanks with Water by private tankers. The water tank was slowly filled with potable water keeping the level in the tank at a maximum height rate of 1.2 meter per 24 hours till reaching the maximum level. If there is any leakage during the test period (24 hours), the tank shall be emptied and the leakage shall be repaired before continuing.

❖ Procedure

- 1) Filling of reinforced concrete water tanks did not exceed a rate of 1.2m in 24 hours. Filling the tank took a lot of time due to the shortage of water availability in the area during summer time.
- 2) The filling reached the maximum operating water surface level and maintain the water at that level for 24 hours.
- 3) Measure the drop in water level over the next 72 hours to determine the loss in water volume for comparison with the allowed leakage limits.
- 4) Measure and record loss of water volume should be at 24 hours intervals.
- 5) If all records for the loss of water volume over the 72 hours does not exceed the allowable leakage limits, the leakage should be considered acceptable.
- 6) If the leakage (loss of waster volume) in any of the three days exceeds the maximum allowable leakage limits, it will be considered as failed.

❖ Acceptance

The following conditions shall be considered as NOT meeting the criteria for acceptance regardless of the actual loss of water volume from the water tank.

- 1) Water leakage into the water tank through floors, walls, or wall-floor joints.
- 2) Water tank which exhibit flowing water from joints, cracks or from beneath the foundation (except for under-drain systems).

Damp spots on the exterior wall surfaces of the water tank appears. The water tightness of concrete tanks should be considered acceptable when loss of water volume is within the allowable leakage limits listed below:

1. For unlined (fair face) tanks with a side water depth of 7.6m or less, loss of volume not exceeding 0.1 percent in 24 hours. Not applicable (NA)
2. For tanks with lined (plastered) walls and a side water depth 9.1m or less, loss of volume

not exceeding 0.06 percent in 24 hours. Steel diaphragms in concrete walls shall be considered the same as a wall liner. (NA)

3. For completely lined tanks (walls and ceiling), loss of volume not exceeding 0.025 percent in 24 hours. (Our Case)

### 3.6.3 Summary of observations and results

The following is a summary of the observations made in relation to Tightness test for Beit Amra Reservoir:

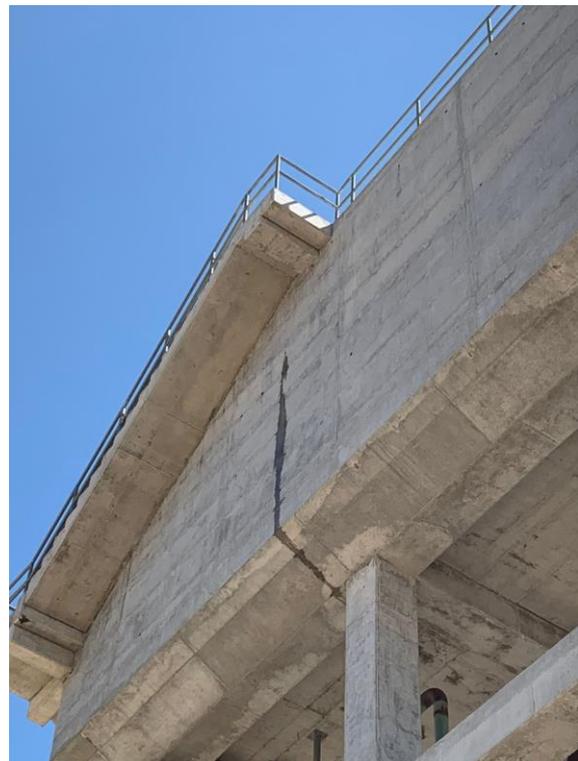
- 1) After filling 25% of the tank, the consultant checked the body of the elevated tank, floors, walls, or wall-floor joints. Nothing was noticed.
- 2) After filling 50% of the tank the consultant checked the body of the elevated tank, floors, walls, or wall-floor joints. Nothing was noticed.
- 3) After filling 75% of the tank the consultant checked the body of the elevated tank, floors, walls, or wall-floor joints. Nothing was noticed.
- 4) After filling 100% of the tank the tank started to leak at three locations.

According to PWA specifications, (If there is any leakage during the test period (24 hours), the tank shall be emptied) the consultant started to empty the tank.

The leakage started at western walls of the tank. Then additional two locations were observed near the slab of the tank. Below are some photos showing the leakage spots.



Beit Ammra leakage Spot #1



Beit Ammra leakage Spot #1



Beit Ammra leakage Spot #2 and #3



Nothing was observed from the bottom

### 3.6.4 Recommendation and Conclusions

The conclusion is that Beit ammra water tank failed the TIGHTNESS TEST. The result is expected as the tank was not used and it was left empty since it was constructed.

Repair measures have to be considered in the tender documents of the completion project. From a technical point of view, these spots can be repaired without any impact on the structure of the tank and it shall not have any potential risks in the future.

The recommendations are:

- 1) Remedy and repair work for this water tank be shall be included in the tender documents
- 2) Tightness test for the three reservoirs shall be part of the tender document of the completion project. The potential remedy and repair works shall also be included.
- 3) Fixing the epoxy coating shall be considered as to be done again after fixing the leakage problems.

### 3.6.5 PHOTOS

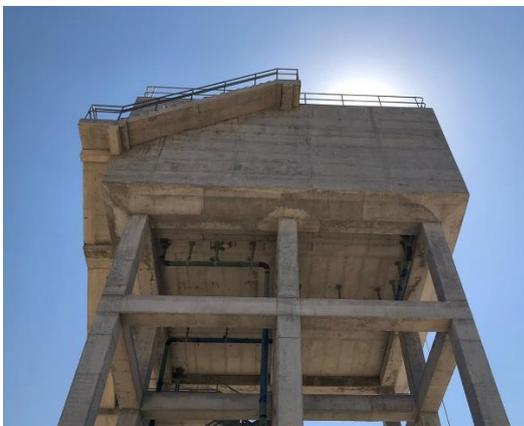
Below are photos during filling Beit Ammra water tank.



Filling the tank by private water tankers using pump installed by the consultant



Filling the tank using pipes installed by the consultant



Tank during the filling- 25% filled. No Water leakage through floors, walls, or wall-floor joints.



Tank during the filling- 25% filled. No Water leakage through floors, walls, or wall-floor joints.



Tank during the filling- 50% filled. No Water leakage through floors, walls, or wall-floor joints.



Tank during the filling- 50% filled. No Water leakage through floors, walls, or wall-floor joints.

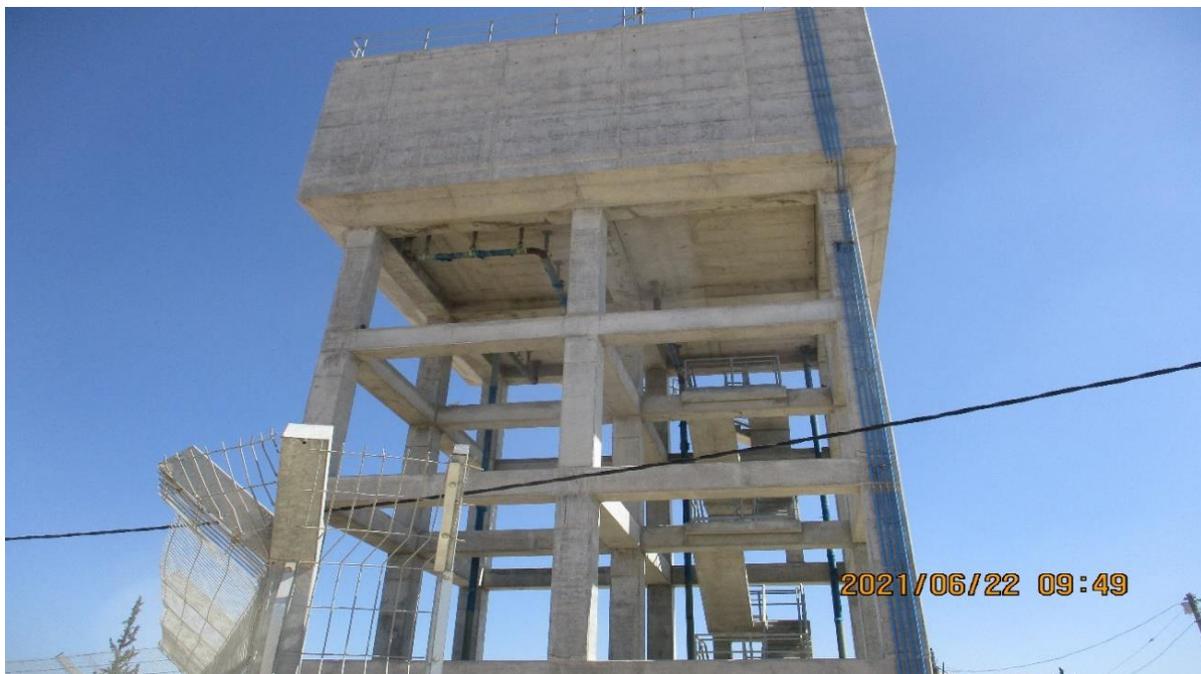
### 3.7 VISUAL ASSESMENT OF THE 3 RESERVOIRS

According to TOR, the three reservoirs: 1) Beit Ammra Elevated Tank (500m<sup>3</sup>), 2) Schools reservoir (1000 m<sup>3</sup>) 3) Khalet Salem Reservoir (5,000 m<sup>3</sup>). All three reservoirs were visually inspected in order to identify the needed works which must be done and shall be included in the tender document for completing YWSP.

#### 3.7.1 Beit Ammra Elevated Reservoir

##### 3.7.1.1 RESERVOIR DESCRIPTION

Beit Ammra is a concrete elevated reservoir located in Beit Ammra west of Yatta City. The concrete works were constructed and completed in 2019. The elevated tank is currently not in operation. The civil works in Beit Ammra elevated tank are 100% completed. The remaining works are related to mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning. **Figure 4** is Beit Ammra Elevated Tank.



**Figure 4. Beit Ammra Elevated Water Tank**

The Reservoir is a 500m<sup>3</sup> elevated tank with 20.4m height (from base level to roof level). The body of the tank is reinforced concrete wall perimeter and thickness of 30 cm. The dimensions are (11.5X11.5X 5.0m). The foundations are reinforced concrete continuous footing with 1.2m thickness.

The elevated tank is based on 9 square reinforced concrete columns with 40 cm X 40 cm each with supporting beams connecting the columns. A reinforced concrete stair with galvanized steel handrails is part of the tank to reach the top roof.

The boundary wall and the fence are 100% surrounds the elevated tank site with two gates. The tank yard is furnished with single size material.

Inlet and outlet pipes were observed at and near the floor of the Reservoir near the center. Ventilation pipes and roof hatches are provided through the roof slab. The tank is internally epoxy coated.

### 3.7.1.2 SUMMARY OF OBSERVATIONS

The points summarize the observation of Beit Ammra visual assessment are:

- 1) The walls, columns and floor of the reservoir are in good conditions. Although, these portions of the Reservoir have been submerged for the majority of the time, and thus not subjected to significant freeze-thaw or air, these portions of the tank are in relatively good condition. No deterioration of the concrete or exposed reinforcing were observed in the columns, walls or floor slabs. Some random shrinkage cracks were observed in the tank walls.
- 2) Several honeycombed were observed.
- 3) The beams did not appear to have any significant deterioration or cracks. The concrete at the top of the column and at the bottom and sides of the beams, joists and slab in the area appeared to be good.
- 4) The elevated tank from outside is full of dust and dirt.
- 5) The Site Yard is not well furnished.
- 6) The concrete surface from outside have some defects that needs some repairs.
- 7) The inlet, outlet, overflow and the washout pipes have some rusts and not insulated.
- 8) The tie rods locations are not repaired.
- 9) Lightning poles are not installed; however, the concrete base of the pole is ready.
- 10) The water level indicator is not installed
- 11) The handrail of the stairs needs some maintenance and repair. Especially at the welding points
- 12) The manholes are covered with backfill. No manhole cover was seen.
- 13) The mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning are not implemented.
- 14) The access road to the reservoir is heavily damaged.

### 3.7.1.3 RECOMMENDATION AND CONCLUSIONS

- 1) The elevated tank shall be cleaned from all dust and dirt before starting any type of repair or epoxy coating.
- 2) Because the tank walls, columns, floor slabs and the majority of the roof structure appeared to be in relatively good condition, there are no major structural concerns. Small concrete repairs are only required.
- 3) The inlet, outlet, overflow and the washout pipes should be treated from rust and insulated.
- 4) The tie rods located on the body of the tank and the boundary walls shall be filled with the proper materials and the surface should be repaired.
- 5) The handrail of the stairs needs some maintenance and repair. Especially at the welding points.
- 6) The mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning must be completed.
- 7) The site of the elevated tank as well as the access road has to be asphalted.
- 8) All the materials, valves, instrumentation needed to complete the elevated tank were supplied and are available in the PWA storehouse except for SCADA panels.

**Beit Ammra tank is in a very good condition except the leakage problem. All the observation and recommendations are part of the pending works which were not completed during the 2019 project**

### 3.7.1.4 PHOTOS

Sample photo for Beit amra are presented hereafter:



Inlet and Outlet Pipes must be treated from rust and insulated.



Tie rods locations must be filled. Electrical poles are not fixed



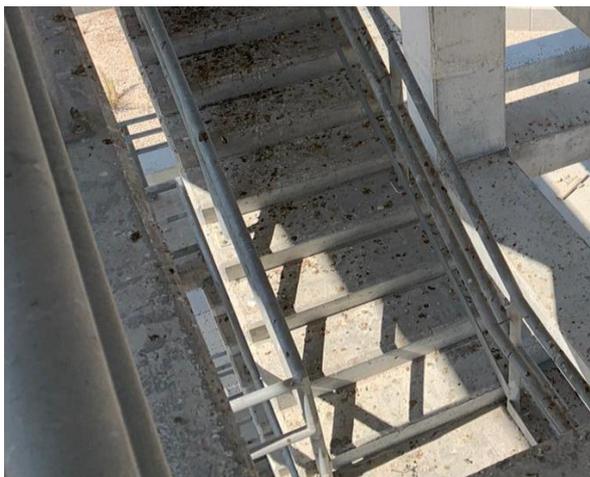
The body of the tank is not painted. The tie rods locations must be treated.



Electrical and SCADA works are not complete



Tank is Epoxy coated from inside but need to improve its tightness



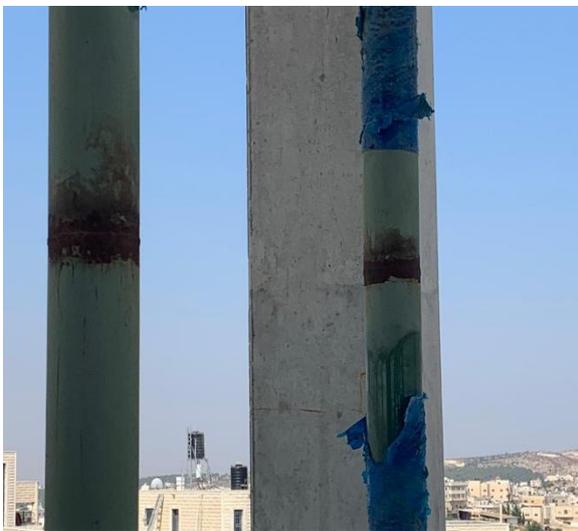
The tank shall be cleaned from inside and outside



Boundary wall and fence are in good conditions



The yard must be asphalted.



Inlet and Outlet Pipes must be treated from rust and get insulated



Earthing, lightening and red lamp are not completed.



Cleaning from inside shall be done



Not presented in the as built Drawings

### 3.7.2 Schools reservoir (1000 m<sup>3</sup>)

#### 3.7.2.1 RESERVOIR DESCRIPTION

Schools reservoir is a concrete on ground tank located near the downtown of Yatta City. The concrete works were constructed and completed in 2019. The tank is currently not in operation. The civil works are 100% completed. The remaining works are related to mechanical and electrical works and miscellaneous works

The reservoir is a 1000m<sup>3</sup> on ground, circular tank with 16.3 m diameter and 6.23m height (from base level to roof level). The body of the tank is reinforced concrete wall perimeter and thickness of 35 cm. The foundations are reinforced concrete raft foundation. The boundary wall and the fence are 100% surrounding the tank site with one gate. The tank yard is furnished with single size material.

Inlet and outlet pipes were not seen. Ventilation pipes and roof hatches are provided through the roof slab. The tank is internally epoxy coated.

Similar to Beit Amra water tank, the civil works are 100% completed and the remaining works are related to mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning. **Figure 5** shows the 1000 m<sup>3</sup> schools' reservoir.



**Figure 5. Schools Reservoir**

#### 3.7.2.2 SUMMARY OF OBSERVATIONS

The points summarize the observation of the school's reservoir visual assessment are:

- 1) The walls and slab of the reservoir were observed to be generally in good condition. Although, these portions of the reservoir have been submerged for the majority of the time, and thus not subjected to significant freeze-thaw or air, these portions of the tank are in relatively good

- conditions. No deterioration of the concrete or exposed reinforcing was observed. Some random shrinkage cracks were observed in the tank.
- 2) Several honeycombed were observed.
  - 3) The tank from outside is full of dust and dirt.
  - 4) The site yard is not well furnished and did not reach the designed level.
  - 5) The concrete surface from outside have some defects that needs some repairs.
  - 6) The inlet and overflow are not installed.
  - 7) Lightning poles are not installed; however, the concrete base of the pole is ready.
  - 8) The water level indicator was not installed
  - 9) The handrail needs some maintenance and repair. Especially at the welding points. The handrail installed on the roof is with one screw only.
  - 10) The manholes are covered with backfill. No manhole cover was seen.
  - 11) The mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning are not implemented.
  - 12) No electrical cables on data cables were located on the site.
  - 13) The tank is not tested against water tightness and was not disinfected. This shall be included in the tender document pf the project completion.

### 3.7.2.3 RECOMMENDATION AND CONCLUSIONS

- 1) The tank shall be cleaned from all dust and dirt before starting any type of repair or epoxy coating.
- 2) The tank walls and slabs and the majority of the roof structure appeared to be in relatively good condition. There are no major structural concerns; small concrete repairs are recommended only.
- 3) The tie rods located on the body of the tank and the boundary walls shall be treated with the proper materials and the surface should be repaired.
- 4) The handrail of the stairs needs some maintenance and repair. Especially at the welding points. Additional screws must be installed.
- 5) The mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning must be completed.
- 6) Some hairy cracks were noticed on the outside of the tank; therefore, the tank should be tested in order to assure the integrity and tightness of the tank.
- 7) The concrete surface from outside should be repaired where needed and should be epoxy painted.
- 8) The yard should be cleaned and the existing layer should be removed. After that the yard should be asphalted.
- 9) The manholes need proper finish from inside.
- 10) All the materials, valves, instrumentation needed to complete the tank were supplied and are available in the PWA storehouse except for SCADA panels.
- 11) Remove some formwork remnants.
- 12) The inlet, outlet, overflow and the washout pipes and flanges to be treated from rust and it should be insulated.

**School's reservoir is in a very good condition. All the observation and recommendations are part of the pending works which were not completed during the 2019**

### 3.7.2.4 PHOTOS

Sample photo for the School's reservoir are presented hereafter:



Cleaning of site from dust and dirt



Painting the reservoir from outside is required



Reservoir yard level is not reached. Additional layers are required



General repair for concrete surface



General repair for concrete surface



Some miscellaneous works are required



General repair for concrete surface



lightening is installed.



Rusted flanges have to be treated and insulated



Remove some formwork remnants



Site Gate has to fixed



Air Vent are installed

### 3.7.3 Khalet Salem reservoir (5,000 m<sup>3</sup>)

#### 3.7.3.1 RESERVOIR DESCRIPTION

Khalet Salem reservoir is a concrete on ground tank located west of Yatta City. The concrete works were constructed and completed in 2019. The tank is currently not in operation. The civil works are 70% completed. The remaining works are related to mechanical works, electrical works, civil works related to landscaping and miscellaneous works

The reservoir is a 5000m<sup>3</sup> on ground circular tank with 25 m diameter and around 11.0 m height (from base level to roof level). The body of the tank is reinforced concrete wall perimeter and thickness of 60 cm. The foundations are reinforced concrete raft foundation. The boundary wall and the fence are 100% surrounding the tank site with two gates. The tank yard is furnished with single size material but it does not reach the final level.

Inlet and outlet pipes were not observed. Ventilation pipes and roof hatches are provided through the roof slab. The tank is internally epoxy coated.

Unlike the other two water reservoirs, the civil works is not completed. But the most of the remaining works are related to mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning. **Figure 6** shows the 5000 m<sup>3</sup> Khalet Salem reservoir.



**Figure 6. Khalet Salem Reservoir**

### 3.7.3.2 SUMMARY OF OBSERVATIONS

The points summarizing the observation of Khalet Salem visual assessment are:

- 1) The walls and slab of the reservoir are generally in good condition. Although, these portions of the reservoir have been submerged for the majority of the time, and thus not subjected to significant freeze-thaw or air, these portions of the tank are in relatively good conditions.
- 2) No deterioration of the concrete or exposed reinforcing was observed. Some random shrinkage cracks were observed in the tank.
- 3) Several honeycombed were observed.
- 4) The tank from outside is full of dust and dirt.
- 5) The Site Yard is not well furnished and did not reach the designed level.
- 6) The concrete surface from outside have some defects that needs repair.
- 7) The inlet and overflow are not installed.
- 8) Lightning poles are not installed; however, the concrete base of the poles is ready.
- 9) The water level indicator is not installed
- 10) The handrail is not installed.
- 11) The ladders are not installed
- 12) The manholes are covered with backfill. No manhole cover was seen.
- 13) The mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning are not implemented.
- 14) No electrical cables on data cables are located on the site.
- 15) The boundary wall and fences are completed. However, the western entrance is not completed in terms of levels and gate.
- 16) The tank is not tested against water tightness and was not disinfected.
- 17) The inlet, outlet, overflow and the washout pipes are not installed
- 18) The lightening and earthing works are not implemented

### 3.7.3.3 RECOMMENDATION AND CONCLUSIONS

- 1) The tank shall be cleaned from all dust and dirt before starting any type of repair or epoxy coating.
- 2) The tank walls and slabs and the majority of the roof structure appeared to be in relatively good condition. There are no major structural concerns. Several concrete repairs are recommended only.
- 3) The tie rods located on the body of the tank and the boundary walls shall be filled with the proper materials and the surface should be repaired.
- 4) The mechanical and electrical works, SCADA, miscellaneous, disinfection and commissioning must be completed.
- 5) Some hairy cracks were noticed on the outside of the tank; therefore, the tank should be tested against tightness in order to ensure the integrity of the tank.
- 6) The concrete surface from outside should be repaired where needed and should be epoxy painted.
- 7) The yard should be cleaned and the existing layer should be removed, after that the yard should be asphalted.
- 8) All the materials, valves, instrumentation needed to complete the elevated tank were supplied and are available in the PWA storehouse except for SCADA panels.
- 9) Remove some formwork remnants.

**Khalet Salem reservoir is in good condition. All the observation and recommendations are part of the pending works which were not completed during the 2019 project**

### 3.7.3.4 PHOTOS

Sample photo for Khalet Salem are presented hereafter:



Reservoir Entrance and gate No.1



Tie rod holes must be repaired and filled



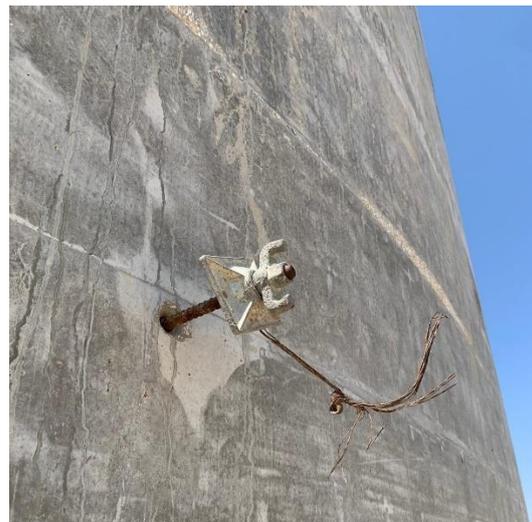
General repair for concrete surface



General repair for concrete surface



Reservoir yard level is not reached. Additional layers are required



Some miscellaneous works are required



General repair for concrete surface



General repair for concrete surface



Reservoir Entrance and gate No 2



General repair for concrete surface and inlet/ outlet

## 3.8 VISUAL ASSESMENT OF THE MANHOLES AND CHAMBERS

### 3.8.1 General

According to project documents, the total number of chambers which were completed or partially completed are 128. This includes the isolation valves in precast or cast in site manholes/champers, Air Valves, Washout Valves, service connection valves, main connection valves and Pressure Reducing Valves (PRVs).

The general statement regarding the manholes is that all chambers are in good conditions. The testing sample was randomly selected for the applicable chambers to cover 10 out of 24 partially completed reinforced concrete cast-in-place chambers and 20 out of 104 partially completed pre-cast reinforced concrete chambers. These are assessed under section 3.3.

Several problems and obstacles were encountered. These problems are:

- Most of the manholes does not have internal stairs.
- Most of the manholes are full of dirt's and water.

Finally, the consultant managed to take all the required inspections in accordance with the TOR.

### 3.8.2 Method of Inspection

The manholes were visually inspected based on the available design drawings, as built drawings and copied with the best international standard. The chambers and manholes were inspected from inside and outside.

### 3.8.3 Summary of observations and results

The walls, slab and floors of the chambers are relatively in acceptable condition. Our team did not observe any serious cracks or deviations.

The main observations are:

- Reinstatement around most of the manhole covers are in bad conditions.
- The manhole rings in 90% of the manholes have to be repaired.
- Manhole covers have to be adjusted with the asphalt level.
- Most of the manholes are full of dirt, water and dust.
- Some pipes/flanges inside the chambers and manholes are rusted and not epoxy coated.

The result of the inspections is presented in Figure 7,8,9, 10 and 11

### 3.8.4 Recommendation and Conclusions

Based on the visual inspection, all chambers are in an acceptable condition, subject that the remining works are completed such as reinstatement, chamber cover adjustment, ladder installation etc.

**The chambers are in acceptable conditions. The remining works has to be completed as in the original design and shall be reflected in the tender documents for the completion project**

Installed Cast In Situ Chambers Assessment													
No.	BOQ Item	Description	Chmber ID	Location	Station								
						Condition	Backfilling	Cover	Vent Pipe	Fixed Ladder	Reinstatement	Completed external connection	Valves Installation
1	2.2.1.14	300, 300, 200, 50mm GateValve Chamber	GV.01	TP-YAT-01, 02 ,03,& 33	1+304	Good	Done	Done	Done /without screen mesh	Not Done	Not Done	Done	Not Done
2	2.2.1.15	300,200,50mm Combined Gate Valve	GV-07	TP-YAT-01,02&33	2+146.42	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
3	2.2.1.16	200,150,50mm Combined Gate Valve	GV-02	TP-YAT-05,06&36	0+261	Good	Done	Done	Done /without screen mesh	Not Done	Not Done	Done	Not Done
4	2.2.2.6	75,75,75mm Combined Air Valve Chamber	A.R.V.01	TP-YAT-01, 02 & 04	0+596.01	Good	Done	Done	Done /without screen mesh	Not Done	Done	Done	Not Done
5	2.2.2.8	75, 75, 75, 50mm Air Valve Chamber	A.R.V02	TP-YAT-01, 02 ,03,& 33	1 +527.92	Good	Done	Done	Not Done	Not Done	Not Done	Done	Not Done
6	2.2.2.10	75, 75, 50mm Air Valve Chamber	A.R.V 09	TP-YAT-01,02&33	1+774.99	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
7	2.2.2.10	75, 75, 50mm Air Valve Chamber	A.R.V 07	TP-YAT-01,02&33	7+246.77	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
8	2.2.2.10	75, 75, 50mm Air Valve Chamber	A.R.V08	TP-YAT-01,02&33	5+934	Good	Done	Done	Done /without screen mesh	Not Done	Not Done	Done	Not Done
9	2.2.2.12	75, 50, 50mm Air Valve Chamber	A.R.V 03	TP-YAT-05,06&36	0+013	Good	Done	Done	Done /without screen mesh	Not Done	Not Done	Done	Done
10	2.2.2.14	50, 50mm Air Valve Chamber	A.R.V 04	TP-YAT-05&36	0+571	Good	Done	Done	Done /without screen mesh	Not Done	Not Done	Done	Done
11	2.2.2.14	50, 50mm Air Valve Chamber	A.R.V 05	TP-YAT-05&32	1+651	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
12	2.2.2.14	50, 50mm Air Valve Chamber	A.R.V 06	TP-YAT-05&32	2+129	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
13	2.2.3.6	100, 75, 50mm Combined Washout Chamber	W.O.09	TP-YAT-01, 02 & 33	1+603.13	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
14	2.2.3.6	100, 75, 50 mm Combined Washout Chamber	W.O 07	TP-YAT-01,02&33	6+575	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
15	2.2.3.8	100, 100, 75mm Combined Washout Chamber	W.O.01	TP-YAT-01, 02 & 04	0+539.11	Good	Done	Done	Done /without screen mesh	Not Done	Done	Done	Done
16	2.2.3.10	100,100,75, 50 mm Combined Washout Chamber	W.O-02	TP-YAT-01,02,03&33	0+833.53	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
17	2.2.3.14	75, 50mm Combined Washout Chamber	W.O03	TP-YAT-05&36	0+436	Good	Done	Done	Done /without screen mesh	Not Done	Not Done	Done	Done
18	2.2.3.16	75 and 75 mm Washout Chamber	W.O 06	TP-YAT-05&32	1+901	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
19	2.2.3.16	75 and 75 mm Washout Chamber	W.O 05	TP-YAT-05&32	1+540	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
20	2.2.4.2.1	150mm pipe for Beit Emra Service Connection Chamber	Service Connection Chamber	TP-YAT-05&32	1+535	Good	Not Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
21	2.2.4.2.4	250mm pipe for Samou service connection (CP-071)	Service Connection Chamber	TP-YAT-01,02&33	2+160	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
22	2.2.4.2.5	300mm pipe for Al rihiya I connection (CP-072)	Service Connection Chamber#01	TP-YAT-03	1+578	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
23	2.2.5.1.10	300,250mm pipes for Mataref Reservoir Connection Chamber	Connection chamber	TP-YAT-01,02&33	2+129.29	Good	Done	Done	Not Done	Not Done	Not Done	Not Done	Not Done
24	2.2.5.1.12	300,250mm pipes for Khallet Saleem Reservoir Connection Chamber	Connection chamber	TP-YAT-01,&04	0+825.00	Good	Done	Done	Not Done	Not Done	Not Done	Done/ one side from 3 sides	Not Done
25	4.2	School Vault Chamber	Reservoir Valve Vault	School Reservoir Yard	Yard	Good	Done	Done	Done /without screen mesh and paint	Done	Not Done	Partial connection	Not Done
26	4.1	School Reservoir W/O chamber	School Reservoir	Yard	Yard	Good	Done	Done	Not Done	Not Done	Not Done	Partial connection	Done

Figure 7. Cast In situ Chamber assessment

Installed Precast Chambers LOG - Along T.P.L and Networks													
No.	BOQ Item	Description	Chmber ID	Location	Station	Condtion	Installation	Cover	Vent	Step Ladder	Reinstatement	Completed external connection	Valves Installation
1	2.2.1.9	2" Gate Valve Chamber-	G.V.42	TP-YAT-02	0+090.32.	Good	Done	Done	NA	Not Done	Done	Done	Done
2	2.2.1.9	2" Gate Valve Chamber	G.V.13	TP-YAT-02	0+424.86.	Good	Done	Done	NA	Not Done	Done	Done	Done
3	2.2.1.9	2" Gate Valve Chamber	G.V.01	Z1-YAT-57	0+003.42	Good	Done	Done	NA	Not Done	Not done	Done	Done
4	2.2.1.9	2" Gate Valve Chamber	G.V.02	Z1-YAT-64-1	0+003.72	Good	Done	Done	NA	Not Done	Not done	Done	Done
5	2.2.1.9	2" Gate Valve Chamber	G.V.03	Z1-YAT-64	0+038.24	Good	Done	Done	NA	Not Done	Not done	Done	Done
6	2.2.1.9	2" Gate Valve Chamber	G.V.59	TP-YAT-33	6+704.20	Good	Done	Done	NA	Not Done	Not done	Done	Done
7	2.2.1.9	2" Gate Valve Chamber	G.V.60	TP-YAT-33	6+974.60	Good	Done	Done	NA	Not Done	Not done	Done	Done
8	2.2.1.9	2" Gate Valve Chamber	G.V.15	Z6-YAT-40	0+326.25	Good	Done	Done	NA	Not Done	Not done	Done	Done
9	2.2.1.9	2" Gate Valve Chamber	G.V.16	Z6-YAT-40-2	0+009.23	Good	Done	Done	NA	Not Done	Not done	Done	Done
10	2.2.1.9	2" Gate Valve Chamber	G.V.11	Z6-YAT-37-1	0+043.68	Good	Done	Done	NA	Not Done	Not done	Done	Done
11	2.2.1.9	2" Gate Valve Chamber	G.V.12	Z6-YAT-37-1	0+212.32	Good	Done	Done	NA	Not Done	Not done	Done	Done
12	2.2.1.9	2" Gate Valve Chamber	G.V.14	Z6-YAT-37-1	0+668.0	Good	Done	Done	NA	Not Done	Not done	Done	Done
13	2.2.1.9	2" Gate Valve Chamber	G.V.18	Z6-YAT-70	0+292	Good	Done	Done	NA	Not Done	Not done	Done	Done
14	2.2.1.9	2" Gate Valve Chamber	G.V.17	Z7-YAT-13	0+471	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
15	2.2.1.9	2" Gate Valve Chamber	G.V.24	Z7-YAT-30	0+197	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
16	2.2.1.9	2" Gate Valve Chamber	G.V.61	Z7-YAT-30	0+255	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
17	2.2.1.9	2" Gate Valve Chamber	G.V.25	Z7-YAT-30	0+511	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
18	2.2.1.9	2" Gate Valve Chamber	G.V.26	Z7-YAT-30	0+970	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
19	2.2.1.9	2" Gate Valve Chamber	G.V.27	Z7-YAT-30	1+131	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
20	2.2.1.9	2" Gate Valve Chamber	G.V.28	Z7-YAT-30	1+529	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Not Done
21	2.2.1.9	2" Gate Valve Chamber	G.V.29	Z7-YAT-29	0+130	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
22	2.2.1.9	2" Gate Valve Chamber	G.V.30	Z7-YAT-29	0+268	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
23	2.2.1.9	2" Gate Valve Chamber	G.V.05	Z3-YAT-35	0+703	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
24	2.2.1.9	2" Gate Valve Chamber	G.V.07	Z3-YAT-59	0+043	Good	Done	Not done	NA	Not Done	Not done	Done	Done
25	2.2.1.9	2" Gate Valve Chamber	G.V.04	Z3-YAT-35	0+220	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done

Figure 8. Precast Manholes/Chambers assessment (Part 1)

Installed Precast Chambers LOG - Along T.P.L and Networks													
No.	BOQ Item	Description	Chmber ID	Location	Station	Condtion	Installation	Cover	Vent	Step Ladder	Reinstatement	Completed external connection	Valves Installation
26	2.2.1.9	2" Gate Valve Chamber	G.V06	Z3-YAT-35	0+060	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to existing	Done
27	2.2.1.9	2" Gate Valve Chamber	G.V.20	Z7-YAT-81	0+003	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected to new T.P.L	Done
28	2.2.1.9	2" Gate Valve Chamber	G.V.057	TP-YAT-33	5+347	Good	Done	Done	NA	Not Done	Not done	Done	Done
29	2.2.1.9	2" Gate Valve Chamber	G.V.058	TP-YAT-33	6+080	Good	Done	Done	NA	Not Done	Not done	Done	Done
30	2.2.1.9	2" Gate Valve Chamber	G.V.019	Z7-YAT-72	0+003	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected from both sides	Not done
31	2.2.1.9	2" Gate Valve Chamber	G.V.031	Z7-YAT-29	0+896	Good	Done	Done	NA	Not Done	Not done	Not Done - not connected from both sides	Not done
32	2.2.1.9	2" Gate Valve Chamber	G.V.56	TP-YAT-33	4+105	Good	Done	Not done	NA	Not Done	Not done	Not Done - not connected from both sides	Done
33	2.2.1.10	3" Flanged Gate Valve Chamber	G.V.03	Z6-YAT-70-1	0+009.46	Good	Done	Done	Done	Not Done	Not done	Done	Done
34	2.2.1.10	3" Gate Valve Chamber	G.V.01	Z3-YAT-60	0+010	Good	Done	Done	Done	Not Done	Not done	Done	Done
35	2.2.1.10	3" Gate Valve Chamber	G.V.05	Z7-YAT-73	0+775	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-28	Done
36	2.2.1.10	3" Gate Valve Chamber	G.V.02	Z4-YAT-82	0+010	Good	Done	Not done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not done
37	2.2.1.10	3" Gate Valve Chamber	G.V.07	Z7-YAT-31	0+638	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not done
38	2.2.1.10	3" Gate Valve Chamber	G.V.06	Z7-YAT-15-1	0+005	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not Done
39	2.2.1.11	4" Gate Vave Chambetr	G.V.022	Z7-YAT-74	0+007	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not Done
40	2.2.1.11	4" Gate Valve Chamber	G.V.35	Z9-YAT-12-1	0+007.57	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new T.P.L	Not Done
41	2.2.1.11	4" Gate Valve Chamber	G.V.29	Z8-YAT-79-1	0+880.00	Good	Done	Not done	Not done	Not Done	Not done	Done	Done
42	2.2.1.11	4" Gate Valve Chamber	G.V.31	Z8-YAT-52	0+030.00	Good	Done	Done	Not done	Not Done	Not done	Done	Done
43	2.2.1.11	4" Gate Valve Chamber	G.V.15	Z6-YAT-40	0+004.7	Good	Done	Done	Done	Not Done	Not done	Done	Done
44	2.2.1.11	4" Gate Valve Chamber	G.V.13	Z6-YAT-53	0+293.48	Good	Done	Done	Done	Not Done	Not done	Done	Done
45	2.2.1.11	4" Gate Valve Chamber	G.V.14	Z6-YAT-53	0+004.32	Good	Done	Done	Done	Not Done	Not done	Done	Done
46	2.2.1.11	4" Gate Valve Chamber	G.V.10	Z6-YAT-37-1	0+005.62	Good	Done	Done	Done	Not Done	Not done	Done	Done
47	2.2.1.11	4" Gate Valve Chamber	G.V.12	Z6-YAT-37	0+103.17	Good	Done	Done	Done	Not Done	Not done	Not Done - not connected to new T.P.L	Done
48	2.2.1.11	4" Gate Valve Chamber	G.V.25	Z7-YAT-30	0+774	Good	Done	Done	Not done	Not Done	Not done	Done	Done
49	2.2.1.11	4" Gate Valve Chamber	G.V.26	Z7-YAT-30	1+525	Good	Done	Done	Not done	Not Done	Not done	Done	Done
50	2.2.1.11	4" Gate Valve Chamber	G.V.51	Z1-YAT-71	0+080	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to existing	Done

Figure 9. Precast Manholes/Chambers assessment (Part 2)

No.	BOQ Item	Description	Chmber ID	Location	Station	Condtion	Installation	Cover	Vent	Step Ladder	Reinstatement	Completed external connection	Valves Installation
51	2.2.1.11	4" Gate Valve Chamber	G.V.01	Z2-YAT-42	0+007	Good	Done	Done	Done	Not Done	Not done	Not Done - not connected to new T.P.L	Done
52	2.2.1.11	4" Gate Valve Chamber	G.V.02	Z2-YAT-41	0+011	Good	Done	Not done	Not done	Not Done	Not done	Not Done - not connected to new T.P.L	Done
53	2.2.1.11	4" Gate Valve Chamber	G.V.03	Z3-YAT-38	0+014	Good	Done	Done	Done	Not Done	Not done	Not Done - not connected to new T.P.L	Done
54	2.2.1.11	4" Gate Valve Chamber	G.V.27	Z7-YAT-29	0+007	Good	Done	Done	Not done	Not Done	Not done	Done	Done
55	2.2.1.11	4" Gate Valve Chamber	G.V.04	Z3-YAT-35	0+793	Good	Done	Done	Done	Not Done	Not done	Done	Done
56	2.2.1.11	4" Gate Valve Chamber	G.V.06	Z3-YAT-34	0+005	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to existing	Done
57	2.2.1.11	4" Gate Valve Chamber	G.V.019	Z7-YAT-15	0+004	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-28	Done
58	2.2.1.11	4" Gate Valve Chamber	G.V.018	Z7-YAT-13	0+770	Good	Done	Done	Done	Not Done	Not done	Not Done - not connected to new YAT-13	Done
59	2.2.1.11	4" Gate Valve Chamber	G.V.024	Z7-YAT-31	0+639	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not done
60	2.2.1.11	4" Gate Valve Chamber	G.V.017	Z7-YAT-13	0+013	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not done
61	2.2.1.11	4" Gate Valve Chamber	G.V.21	Z7-YAT-31	0+022	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not done
62	2.2.1.11	4" Gate Valve Chamber	G.V.11	Z6-YAT-37	0+071	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Done
63	2.2.1.11	4" Gate Valve Chamber	G.V.08	Z5-YAT-18	0+030	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not done
64	2.2.1.12	6" Gate Valve Chamber	G.V.06	Z8-YAT-79	0+030.05	Good	Done	Not done	Not done	Not Done	Not done	Done	Done
65	2.2.1.12	6" Gate Valve Chamber	G.V.01	Z1-YAT-71	0+034	Good	Done	Done	Done	Not Done	Not done	Not Done - not connected to new T.P.L	Done
66	2.2.1.12	6" Gate Valve Chamber	G.V.03	Z6-YAT-37	0+007	Good	Done	Done	Not done	Not Done	Not done	Done	Done
67	2.2.1.12	6" Gate Valve Chamber	G.V.02	Z3-YAT-35	0+007	Good	Done	Done	Done	Not Done	Not done	Not Done - not connected to new T.P.L	Done
68	2.2.1.12	6" Gate Valve Chamber	G.V.05	Z7-YAT-16	0+005	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected from both sides	Not done
69	2.2.2.2	2" Combination Air Valve Chamber	A.R.V.12	Z6-YAT-70-1	0+157.70	Good	Done	Done	Not done	Not Done	Not done	Done	Done
70	2.2.2.2	2" Air Release Valve	A.R.V.10	Z6-YAT-37	0+074.93	Good	Done	Done	Not done	Not Done	Not done	Done	Done
71	2.2.2.2	2" Air Release Valve	A.R.V.01	Z1-YAT-71	0+373	Good	Done	Done	Done	Not Done	Not done	Done	Done
72	2.2.2.2	2" Air Release Valve	A.R.V.02	Z2-YAT-42	0+012	Good	Done	Done	Not done	Not Done	Not done	Done	Done
73	2.2.2.2	2" Air Release Valve	A.R.V.03	Z2-YAT-41	0+013	Good	Done	Done	Not done	Not Done	Not done	Done	Done
74	2.2.2.2	2" Air Release Valve	A.R.V.04	Z3-YAT-38	0+137	Good	Done	Done	Not done	Not Done	Not done	Done	Done
75	2.2.2.2	2" Air Release Valve	ARV05	Z3-YAT-35	0+007	Good	Done	Done	Done	Not Done	Not done	Done	Done
76	2.2.2.2	2" Air Release Valve	ARV019	Z7-YAT-29	0+000	Good	Done	Done	Done	Not Done	Not done	Done	Done
77	2.2.2.2	2" Air Release Valve	ARV07	Z3-YAT-34	0+010	Good	Done	Done	Done	Not Done	Not done	Done	Done
78	2.2.2.2	2" Air Release Valve	ARV014	Z7-YAT-28	0+801	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-28	Not Done
79	2.2.2.2	2" Air Release Valve	ARV15	Z7-YAT-13	0+551	Good	Done	Done	Done	Not Done	Not done	Done	Done
80	2.2.2.2	2" Air Release Valve	A.R.V. 11	Z6-YAT-53	0+298	Good	Done	Done	Not done	Not Done	Not done	Done	Done

Figure 10. Precast Manholes/Chambers assessment (Part 3)

No.	BOQ Item	Description	Chmber ID	Location	Station	Condition	Installation	Cover	Vent	Step Ladder	Reinstatement	Completed external connection	Valves Installation
81	2.2.2.2	2" Air Release Valve	A.R.V.20	Z7-YAT-29	1+081	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-29	Not done
82	2.2.2.2	2" Air Release Valve	A.R.V.017	Z8-YAT-75	0+039	Good	Done	Not done	Not done	Not Done	Not done	Not Done - not connected to new YAT-75	Not done
83	2.2.2.2	2" Air Release Valve	A.R.V.018	Z7-YAT-30	0+490	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-30	Not done
84	2.2.2.2	2" Air Release Valve	A.R.V.016	Z7-YAT-16	0+854	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-16	Not done
85	2.2.2.2	2" Air Release Valve	A.R.V.022	Z8-YAT-51	0+025	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-51	Not done
86	2.2.2.2	2" Air Release Valve	A.R.V.023	Z8-YAT-46	0+010	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-46	Not done
87	2.2.2.2	2" Air Release Valve	A.R.V.08	Z4-YAT-77	0+080	Good	Done	Not done	Not done	Not Done	Not done	Not Done - not connected to new YAT-77	Not done
88	2.2.2.2	2" Air Release Valve	A.R.V.28	Z9-YZT-14	0+010	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-14	Not done
89	2.2.2.2	2" Air Release Valve	A.R.V.25	Z8-YAT-85	0+320	Good	Done	Not done	Not done	Not Done	Not done	Not Done - not connected to new YAT-85	Not done
90	2.2.2.2	2" Air Release Valve	A.R.V.24	Z8-YAT-22	0+090	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-22	Not done
91	2.2.2.2	2" Air Release Valve	A.R.V.30	Z9-YZT-23	0+290	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-23	Not done
92	2.2.2.2	2" Air Release Valve	A.R.V.31	Z9-YZT-23-1	0+530	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-23-1	Not done
93	2.2.2.2	2" Air Release Valve	A.R.V.27	Z9-YZT-21	0+048	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-21	Not done
94	2.2.2.4	3" Air Release Valve	A.R.V.01	TP-YAT-01	0+017	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-01	Not done
95	2.2.3.2	2" Washout Chamber	W.O 06	Z6-YAT-70-1	0+037.44	Good	Done	Done	Done	Not Done	Not done	Done	Done
96	2.2.3.2	2" Washout Chamber	W.O.07	Z6-YAT-53-1	0+354.92	Good	Done	Done	Done	Not Done	Not done	Done	Done
97	2.2.3.2	2" Washout Chamber	W.O.01	Z1-YAT-71-1	0+109	Good	Done	Done	Done	Not Done	Not done	Done	Done
98	2.2.3.2	2" Washout Chamber	W.O.03	Z2-YAT-41-1	0+586	Good	Done	Done	Not done	Not Done	Not done	Done	Done
99	2.2.3.2	2" Washout Chamber	W.O 012	Z7-YAT-30	1+129	Good	Done	Done	Not done	Not Done	Not done	Done	Done
100	2.2.3.2	2" Washout Chamber	W.O 04	Z3-YAT-34	0+287	Good	Done	Done	Done	Not Done	Not done	Done	Done
101	2.2.3.2	2" Washout Chamber	W.O.08	Z7-YAT-13	0+421	Good	Done	Done	Done	Not Done	Not done	Done	Done
102	2.2.3.2	2" Washout Chamber	W.O 09	Z7-YAT-15	0+884	Good	Done	Done	Done	Not Done	Not done	Done	Done
103	2.2.3.2	2" Washout Chamber	W.O.11	Z7-YAT-31	1+318	Good	Done	Done	Not done	Not Done	Not done	Not Done - not connected to new YAT-31	Not done
104	2.2.3.4	3" Washout Chamber	W.O.01	Z3-YAT-35	0+390	Good	Done	Done	Done	Not Done	Not done	Done	Done

Figure 11. Precast Manholes/Chambers assessment (Part 4)

## 3.9 ASSESS MOST OF WORKS DONE, BY A THIRD PARTY

### 3.9.1 General

After the stoppage of YWSR, Yatta Municipality did several works in order to ensure health and safety requirements and the continuation of the water services. These works were done either by Yatta Municipality or by a third party (MoLG, UNICEF, PARC, MDLF etc.). These works are:

- 1) Miscellaneous works such as closing open trenches, secure some sites etc.
- 2) Many water connections/consumers were disconnected during the implementation of the works and were left without water service. Yatta Municipality applied measures to reconnect the customers by integrating the old network with the new network. **Figure 12** shows the pipelines which are in operation.
- 3) Funded projects through UNICEF and PARC. Mainly the main pipeline serving Beit Ammra elevated water tank. The works consisted of installation of pipes, chambers, testing, and full pavement of the road. In addition, there have been extension of pipe works.
- 4) Funded Projects through MDLF. The Works consist of full pavement of different road sections. The works included the required pipe connection, tests, chambers, etc. **Figure 13** shows the reinstatement works implemented by third parties after the stoppage of the project.

### 3.9.2 Recommendation and Conclusions

The works done by third parties were done in accordance with PWA specification, MoPW specification and the best practice of International Standard.

The main observation is related to the works done by the municipality. Yatta Municipality reconnected some customers by integrating the old network with the new network. This has to be considered in tender document of the completion project to reconnect those houses with the new network only.

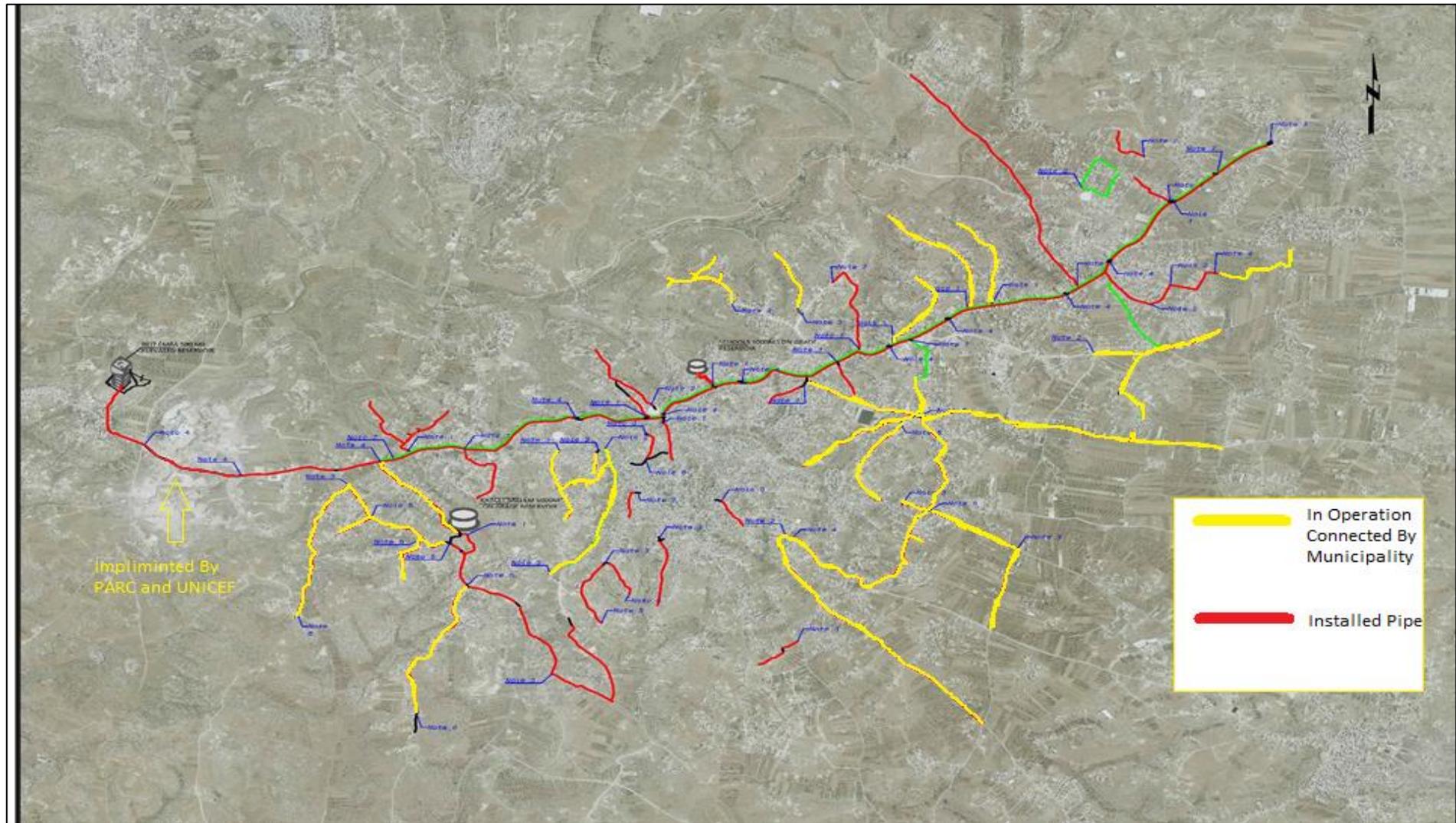


Figure 12. Installed Pipes after being connected and put in operation by Yatta municipality

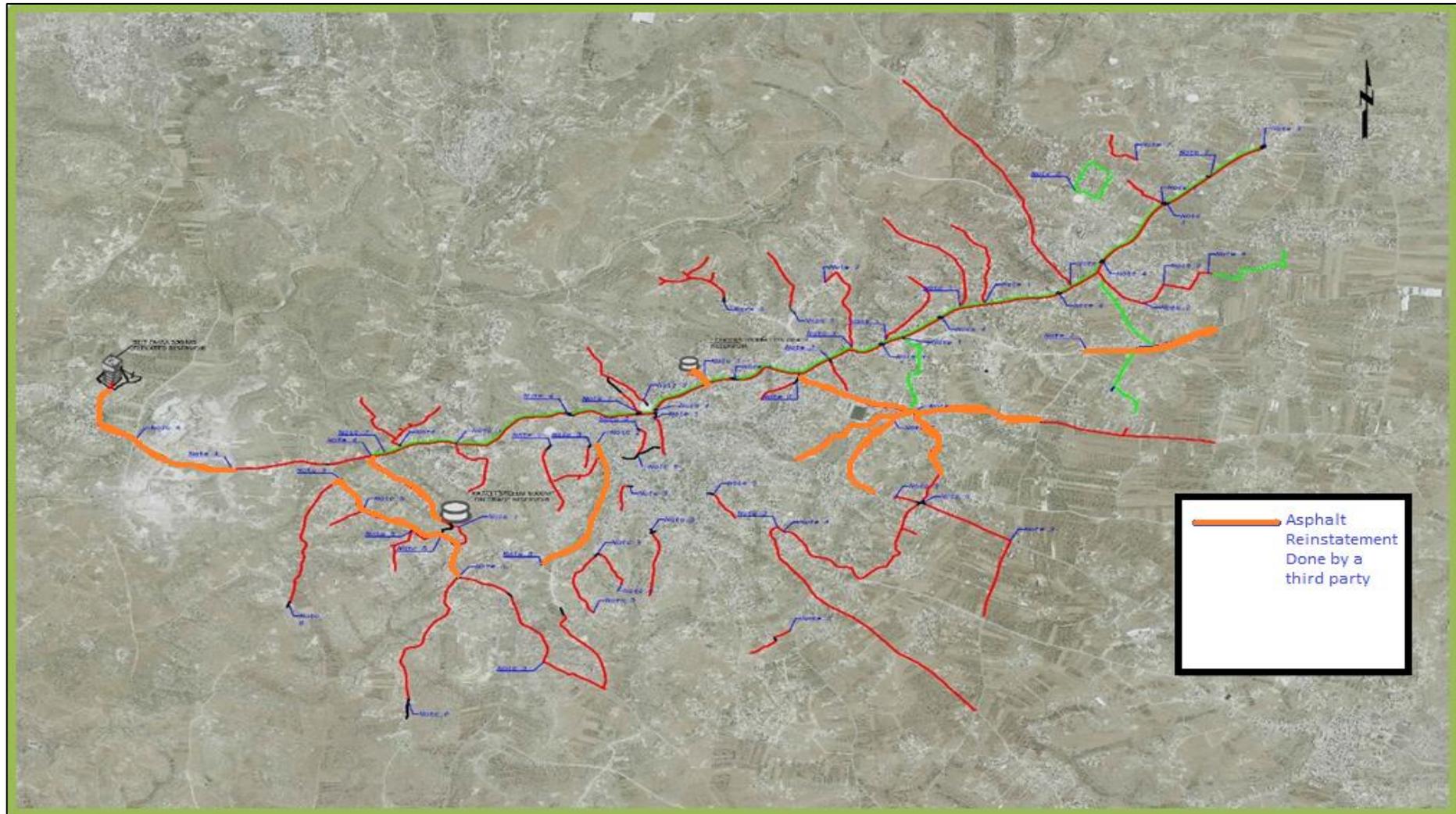


Figure 13. The Reinstatement works done by Yatta municipality and other parties

## 4. PROBLEMS AND PROJECT RISKS

Project risk is defined as “an uncertain event or condition that, if it occurs, has a positive or negative effect on the project’s objectives”. Knowing how to deal with project risks depends on the specific project risk we may encounter and can lead to a successful project.

When planning a project, risks are still uncertain: they haven’t happened yet. But eventually, some of the risks that you plan for do happen, and that is when you have to deal with them.

Managing risks on projects is a process that includes risk assessment and a mitigation strategy for those risks. Risk assessment includes both the identification of potential risk and the evaluation of the potential impact of the risk. A risk mitigation plan will be designed to eliminate or minimize the impact of the risks; occurrences that have a negative impact on the project.

The mitigation of risks is an ongoing process during the consultancy assignment and it will include brainstorming sessions with the technical team to create a list of what could go wrong and include that in the tender documents (Specification, General and particular conditions etc.)

**Table 5** lists some of the expected project risks

**Table 5. Project Risks and Proposed Mitigations**

#	Main Risk	Risk Description	Consultant Assessment	Mitigation Measures/ Action
1	Pressure Tests	Only 10% of the installed pipes were tested. This can have a major impact on the type of works to be tendered if a significant % of the pipes failed in pressure test.	The Consultant did a 1 km random pressure test to get an indication on the pressure test results. The results are very satisfactory	A pressure test for all the completed and non-completed pipe shall be conducted and be part of the tender documents of the completion project
2	Materials Warranty	The Warranties of the Valves, equipment and instrumentation are outdated.	The consultant did a comprehensive visual inspection to determine the condition of the valves, equipment's and instrumentation. The results are very satisfactory.	It is required to specify some items to mitigate the risk to its lowest impact. However, the Municipality shall carry out the liability of the works. The project shall support the Municipality by equipment's and spare parts materials.
3	Store Management during Implementation	Most of the Valves, equipment and instrumentation are stored in PWA rented storehouse. During the implementation, getting the material out of the storage to hand them to the Contractor could cause some risks.	Store Management during Implementation shall be done in order to facilitate the works and avoid any potential problems and risks.	The consultant will create and propose a store management plan to control the handover of the valves, equipment's and instrumentation. This will mitigate the risk to its lowest impact.
5	Type of remaining works	The remaining works are mainly supplementary works that some Contractors do not like to implement.	-	There are a significant number of qualified Contractors in Palestine that can successfully implement the remaining works.
6	Unused Steel Pipes since 2019	Most of the main lines were not used since 2019. This may affect the condition of the steel pipes from inside.	The pipes are in good conditions.	The tender documents shall include some measures to make sure that all the pipes that are in service are accepted for drinking water quality.
7	Specifications	The design of works and implementation were done according to the Jordanian Specs.	-	PWA specifications will be used and applied.

## 5. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The completed and non-completed project components appear to be in good condition.

- The conclusion of the assessment of stored is that the risks coming from the materials handed over to PWA after the stoppage of the project are minimal and shall not have any significant impact during the completion of the project or during operation.
- The conclusion of the assessment of the chambers is that the compressive strength is within the standard and they are in a good condition. The risks are unforeseeable.
- The conclusion of the assessment of the asphalt testing is that a second layer and complete the asphalted trench and parts of the road are required.
- All the technical assessments recommendations shall be considered in the tender document.
- The conclusion of the assessment basecourse and bedding materials is that Additional compaction before reinstatement shall enhance the compaction.
- Beit Amra tank is in a very good condition except the leakage problem. The remaining works has to be completed and the leakage has to be repaired.
- School's reservoir is in a very good condition. The remaining works has to be completed.
- Khalet Salem reservoir is in good condition. The remaining works has to be completed.
- The Tender Document of the completion project shall have items to make pressure tests for all the installed pipes. Special conditions and BOQ items shall be considered in order to mitigate all the possible risks coming from the not tested steel pipes.

As an overall conclusion, going forward with completing the project shall not have adverse significant risks to the donor, employer or the beneficiary.

## APPENDICES



## APPENDIX 1: MATERIALS AND SPARE PARTS HANDED OVER TO PWA INSPECTION CHECKLIST

## Colors meanings

■	<ul style="list-style-type: none"><li>● Good Condition materials</li><li>● Can be used in the project without any problem</li></ul>
■	<ul style="list-style-type: none"><li>● Bad Condition materials</li><li>● Shall not be used in the project without any problem</li></ul>
■	<ul style="list-style-type: none"><li>● Was not found in the storehouse</li></ul>

No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
1	ModBus electromagnetic flow meters for reservoirs with batteries DN6" PN25	BCI/ABB	Yes	ea	1.00	Yes	Good	Yes	Battery Shall be replaced
2	ModBus electromagnetic flow meters for reservoirs with batteries DN10" PN16	BCI/ABB	Yes	ea	1.00	Yes	Good	Yes	Battery Shall be replaced
3	ModBus electromagnetic flow meters for reservoirs with batteries DN6" PN16	BCI/ABB	Yes	ea	1.00	Yes	Good	Yes	Battery Shall be replaced
4	ModBus electromagnetic flow meters for reservoirs with batteries DN12" PN16	BCI/ABB	Yes	ea	1.00	Yes	Good	Yes	Battery Shall be replaced
5	ModBus electromagnetic flow meters for reservoirs with batteries DN12" PN16	BCI/ABB	Yes	ea	1.00	Yes	Good	Yes	Battery Shall be replaced
6	ModBus electromagnetic flow meters for reservoirs with batteries DN12" PN16	BCI/ABB	Yes	ea	1.00	Yes	Good	Yes	Battery Shall be replaced
7	MW Antenna with FM batteries	BCI/ Alvarion	Yes	ea	6.00	Yes	Good	Yes	Battery Shall be replaced
8	Breaker panel 40X60X25	Nasserco / ABB	Yes	ea	2.00	Yes	Good	Yes	-
9	Stainless steel Boxes	Nasserco / TURKY	Yes	ea	9.00	Yes	Good	Yes	-
10	HART-handheld calibrator	BCI / ABB	Yes	ea	1.00	Yes	Good	Yes	-
11	Surge arrestors	BCI / WEIDMULLER	Yes	ea	2.00	Yes	Good	Yes	-
12	Fuses 6-10 A	BCI / WEIDMULLER	Yes	ea	20.00	Yes	NA	No	Shall be replaced
13	Relays	BCI / WEIDMULLER	Yes	ea	2.00	Yes	NA	No	Shall be replaced
14	Cat 6A patch cable 2 M	BCI / CAT6A	Yes	ea	10.00	Yes	Good	Yes	-
15	Spare I/O module	BCI / MOTOROLA	Yes	ea	1.00	Yes	Good	Yes	-
16	Redundant 24V power supply	BCI / SCHNIDER	Yes	ea	1.00	Yes	Good	Yes	-
17	Manual Pressure Calibrator with Digital Calibration Gage	ABC/Fluke	Yes	ea	1.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
18	Spare US Pressure gauge PN 0-16	ABC/Keyroc	Yes	ea	1.00	Yes	Good	Yes	-
19	Spare US Pressure gauge PN 0-25	ABC/Keyroc	Yes	ea	1.00	Yes	Good	Yes	-
20	RTU panel 80X100X20	BCI / MOTOROLLA	Yes	ea	3.00	Yes	Good	Yes	-
21	UBS 1 KVA	BCI / EATON	Yes	ea	3.00	Yes	Good	Yes	-
22	Proximity switch	BCI/ INTERLOGEX	Yes	ea	6.00	Yes	Good	Yes	-
23	Level float switch	BCI/ Key	Yes	ea	6.00	Yes	Good	Yes	-
24	Level transmitter with 3-way ball valve 1/2"	BCI/ABB	Yes	ea	3.00	Yes	Good	Yes	-
25	Beacon light complete for Beit Emra reservoir	NASSERCO / DELTA BOX	Yes	ea	1.00	Yes	Good	Yes	-
26	Lighting fixtures for poles	Nasserco / Amaria	Yes	ea	10.00	Yes	Good	Yes	-
27	Lighting fixtures for Beit Emra reservoir	Nasserco / Gaeish	Yes	ea	6.00	Yes	Good	Yes	-
28	Earthing pits 25x25x20	Nasserco / Furse	Yes	ea	18.00	Yes	Good	Yes	-
29	Air terminals 60CM	Nasserco / Furse	Yes	ea	29.00	Yes	Good	Yes	-
30	Earthing copper conductor 120mm	Nasserco / Pamukkale	Yes	lm	100.00	Yes	Good	Yes	-
31	LV power cable 3*2.5mm2	Nasserco / Pamukkale	Yes	lm	100.00	Yes	Good	Yes	-
32	Lighting poles angles	Nasserco / Amaria	Yes	ea	10.00	Yes	Good	Yes	-
33	Lightning copper conductor 35mm	Nasserco / Furse	Yes	lm	200.00	Yes	Good	Yes	-
34	LV power cable 3*6mm2	Nasserco / Pamukkale	Yes	lm	400.00	Yes	Good	Yes	-
35	Lighting poles base plate 50X50X120	Nasserco / Amaria	Yes	ea	5.00	Yes	Good	Yes	-
36	3" Panels supports for Schools reservoir ( Stainless Steel)	Nasserco / Fabrication	Yes	ea	3.00	Yes	Good	Yes	-
37	1.5" Stainless steel pipes for Schools and Beit Emra reservoirs	Nasserco / Furse	No.	ea	2.00	No.	-	-	-

No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
38	Earthing electrode 3m	Nasserco / Furse	No	ea	12.00	-	-	-	
39	2" UPVC conduits	NASSERCO / PLASSIM	Yes	lm	50.00	Yes	Good	Yes	-
40	1" UPVC conduits	NASSERCO / PLASSIM	Yes	lm	100.00	Yes	Good	Yes	-
41	3" MW antenna pole	BCI / FABRICATION	Yes	ea	1.00	Yes	Good	Yes	-
42	Control and Signal Cables	BCI / OREN	Yes	lm	500.00	Yes	Good	Yes	-
43	Control Cables	BCI / OREN	Yes	lm	300.00	Yes	Good	Yes	-
44	Flow Control Valve DN250 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
45	Flow Control Valve DN250 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
46	Pressure Reducing Valve DN150 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
47	Pressure Relief Valve DN50 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
48	Flow Control Valve DN100 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
49	Altitude Control Valve DN250 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
50	Pressure Reducing Valve DN100 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
51	Pressure Reducing Valve DN150 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
52	Flow Control Valve DN100 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
53	Pressure Reducing Valve DN80 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
54	Pressure Reducing Valve DN80 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
55	Pressure Reducing Valve DN50 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
56	Pressure Reducing Valve DN80 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
57	Pressure Reducing Valve DN100 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model# /Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
58	Pressure Reducing Valve 40mm threaded PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
59	Pressure Reducing Valve 40mm threaded PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
60	Pressure Reducing Valve 40mm threaded PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
61	Altitude Control Valve DN150 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
62	Pressure Reducing Valve DN250 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
63	Pressure Reducing Valve DN50 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
64	Pressure Reducing Valve DN50 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
65	Pressure Relief Valve DN50 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
66	Pressure Relief Valve DN50 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
67	Flow Control Valve DN250 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
68	Pressure Reducing Valve 720 Spare Part DN100 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
69	Pressure Reducing Valve 720 Spare Part DN250 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
70	Pressure Reducing Valve 720 Spare Part DN200 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
71	Pressure Reducing Valve 720 Spare Part DN250 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
72	Pressure Reducing Valve 720 Spare Part DN80 PN16	SMA/Bermad	Yes	ea	3.00	Yes	Good	Yes	-
73	Pressure Reducing Valve 720 Spare Part DN50 PN16	SMA/Bermad	Yes	ea	3.00	Yes	Good	Yes	-
74	Pressure Reducing Valve 720 Spare Part DN100 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
75	Pressure Reducing Valve 720 Spare Part DN150 PN25	SMA/Bermad	Yes	ea	2.00	Yes	Good	Yes	-
76	Pressure Reducing Valve 720 Spare Part 40mm threaded PN16	SMA/Bermad	Yes	ea	3.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
77	Pressure Relief Valves 73Q Spare Part DN50 PN16	SMA/Bermad	Yes	ea	3.00	Yes	Good	Yes	-
78	Flow Control Valve 770 Spare Part DN100 PN25	SMA/Bermad	Yes	ea	2.00	Yes	Good	Yes	-
79	Flow Control Valve 770 Spare Part DN250 PN25	SMA/Bermad	Yes	ea	3.00	Yes	Good	Yes	-
80	Flow Control Valve 770 Spare Part DN150 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
81	Altitude Valve 750-80 Spare Part DN150 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
82	Altitude Valve 750-80 Spare Part DN250 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
83	Altitude Valve 750-80 Spare Part DN200 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
84	Flow Control Valve 770 Spare Part DN100 PN25	SMA/Bermad	Yes	ea	4.00	Yes	Good	Yes	-
85	Flow Control Valve 770 Spare Part DN250 PN25	SMA/Bermad	Yes	ea	6.00	Yes	Good	Yes	-
86	Flow Control Valve 770 Spare Part DN150 PN25	SMA/Bermad	Yes	ea	2.00	Yes	Good	Yes	-
87	Pressure Reducing Valve DN250 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
88	Flow Control Valve DN150 PN25	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
89	Pressure Reducing Valve DN200 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
90	Altitude Control Valve DN200 PN16	SMA/Bermad	Yes	ea	1.00	Yes	Good	Yes	-
91	NIBCO Gate Valve With Position Ind. & Handwheel DN100 PN25	S.AL/NIBCO	Yes	ea	15.00	Yes	Good	Yes	-
92	NIBCO Gate Valve With Position Ind. & Handwheel DN50 PN25	S.AL/NIBCO	Yes	ea	14.00	Yes	Good	Yes	-
93	NIBCO Gate Valve With Position Ind. & Handwheel DN80 PN25	S.AL/NIBCO	Yes	ea	10.00	Yes	Good	Yes	-
94	Air Valve - VAG Without Surge Check DN50 PN16/25	SMA/VAG	Yes	ea	37.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model# /Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
95	Surge Check Valve for ARV - VAG DN100 PN16/25	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
96	Surge Check Valve for ARV - VAG DN80 PN16/25	SMA/VAG	Yes	ea	28.00	Yes	Good	Yes	-
97	St. St. Three Way Valve 1/2" BSPT - Genebree	SMA/Genebree	Yes	ea	22.00	Yes	Good	Yes	-
98	St. St. Two Way Valve 1" BSPT - Genebree	SMA/Genebree	Yes	ea	19.00	Yes	Good	Yes	-
99	St. St. Two Way Valve 1" BSPT - HAITIMA	ABC/HAITIMA	Yes	ea	14.00	Yes	Good	Yes	-
100	St. St. Two Way Valve 1 1/2" BSPT (for Reservoirs) - Genebree	SMA/Genebree	Yes	ea	25.00	Yes	Good	Yes	-
101	St. St. Swing Check Valve 1 1/2" (for Reservoirs) - Genebree	SMA/Genebree	Yes	ea	3.00	Yes	Good	Yes	-
102	Gate Valve GV-2 with Position Ind. & Handwheel DN50 PN16	SMA/VAG	Yes	ea	19.00	Yes	Good	Yes	-
103	Gate Valve GV-2 with Position Ind. & Handwheel DN100 PN16	SMA/VAG	Yes	ea	10.00	Yes	Good	Yes	-
104	Gate Valve GV-2 with Position Ind. & Handwheel DN100 PN16	SMA/VAG	Yes	ea	10.00	Yes	Good	Yes	-
105	Insulating Gaskets (full face Gasket) DN50 PN16	ABC/China	Yes	ea	26.00	Yes	Fair	No	All Gaskets were stored in normal weather condition. It is very risky to use them
106	Insulating Gaskets (full face Gasket) DN50 PN25	ABC/China	Yes	ea	16.00	Yes	Fair	No	
107	Insulating Gaskets (full face Gasket) DN80 PN16	ABC/China	Yes	ea	33.00	Yes	Fair	No	
108	Insulating Gaskets (full face Gasket) DN80 PN25	ABC/China	Yes	ea	19.00	Yes	Fair	No	
109	Insulating Gaskets (full face Gasket) DN100 PN16	ABC/China	Yes	ea	46.00	Yes	Fair	No	
110	Insulating Gaskets (full face Gasket) DN100 PN25	ABC/China	Yes	ea	12.00	Yes	Fair	No	
111	Insulating Gaskets (full face Gasket) DN150 PN16	ABC/China	Yes	ea	15.00	Yes	Fair	No	

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model# /Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
112	Insulating Gaskets (full face Gasket) DN150 PN25	ABC/China	Yes	ea	9.00	Yes	Fair	No	All Gaskets were stored in normal weather condition. It is very risky to use them
113	Insulating Gaskets (full face Gasket) DN200 PN16	ABC/China	Yes	ea	19.00	Yes	Fair	No	
114	Insulating Gaskets (full face Gasket) DN200 PN25	ABC/China	Yes	ea	8.00	Yes	Fair	No	
115	Insulating Gaskets (full face Gasket) DN250 PN16	ABC/China	Yes	ea	1.00	Yes	Fair	No	
116	Insulating Gaskets (full face Gasket) DN250 PN25	ABC/China	Yes	ea	8.00	Yes	Fair	No	
117	Insulating Gaskets (full face Gasket) DN300 PN16	ABC/China	Yes	ea	22.00	Yes	Fair	No	
118	Insulating Gaskets (full face Gasket) DN300 PN25	ABC/China	Yes	ea	11.00	Yes	Fair	No	
119	Insulating Sleeves for M16 Bolts	ABC/China	Yes	L.m	56.00	Yes	Good	Yes	-
120	Insulating Sleeves for M20 Bolts	ABC/China	Yes	L.m	31.00	Yes	Good	Yes	-
121	Insulating Sleeves for M24 Bolts	ABC/China	Yes	L.m	33.00	Yes	Good	Yes	-
122	Insulating Sleeves for M27 Bolts	ABC/China	Yes	L.m	21.00	Yes	Good	Yes	-
123	Insulating Washer for M16 Bolts	ABC/China	Yes	each/Piece	1,905.00	Yes	Good	Yes	-
124	Insulating Washer for M20 Bolts	ABC/China	Yes	each/Piece	920.00	Yes	Good	Yes	-
125	Insulating Washer for M24 Bolts	ABC/China	Yes	each/Piece	920.00	Yes	Good	Yes	-
126	Insulating Washer for M27 Bolts	ABC/China	Yes	each/Piece	575.00	Yes	Good	Yes	-
127	Metraflex Pipe Penetration Seal Model MS-200-E Seal Material: EPDM Black (Type E), Pressure Plates: Glass Reinforced Plastic Each Belt has 10 Links	ABC/Metraflex	Yes	ea	26.00	Yes	Good	Yes	-
128	Metraflex Pipe Penetration Seal Model MS-300-E Seal Material: EPDM Black	ABC/Metraflex	Yes	ea	293.00	Yes	Good	Yes	-

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	(Type E), Pressure Plates: Glass Reinforced Plastic Each Belt has 10 Links								
129	Metraflex Pipe Penetration Seal Model MS-340-E Seal Material: EPDM Black (Type E), Pressure Plates: Glass Reinforced Plastic Each Belt has 10 Links	ABC/Metraflex	Yes	ea	68.00	Yes	Good	Yes	-
130	Metraflex Pipe Penetration Seal Model MS-425-E Seal Material: EPDM Black (Type E), Pressure Plates: Glass Reinforced Plastic Each Belt has 10 Links	ABC/Metraflex	Yes	ea	48.00	Yes	Good	Yes	-
131	PEN SEAL for Pipe- Penetration PS-275: EPDM BLACK TYPE E Pressure Plates: Glass Reinforced Plastic Each Belt has 10 Links	ABC/PROCO	Yes	ea	25.00	Yes	Good	Yes	-
132	Viking Johnson Dismantling Joint St. St. 316 DN300 PN16	SMA/Viking Johnson	Yes	ea	6.00	Yes	Good	Yes	-
133	Viking Johnson Dismantling Joint St. St. 316 DN300 PN16	SMA/Viking Johnson	Yes	ea	6.00	Yes	Good	Yes	-
134	Viking Johnson Dismantling Joint St. St. 316 DN300 PN16	SMA/Viking Johnson	Yes	ea	8.00	Yes	Good	Yes	-
135	Viking Johnson Dismantling Joint St. St. 316 DN300 PN16	SMA/Viking Johnson	Yes	ea	8.00	Yes	Good	Yes	-
136	Viking Johnson Dismantling Joint St. St. 316 DN300 PN25	SMA/Viking Johnson	Yes	ea	2.00	Yes	Good	Yes	-
137	Viking Johnson Dismantling Joint St. St. 316 DN300 PN25	SMA/Viking Johnson	Yes	ea	2.00	Yes	Good	Yes	-
138	Viking Johnson Dismantling Joint St. St. 316 DN300 PN25	SMA/Viking Johnson	Yes	ea	3.00	Yes	Good	Yes	-
139	Viking Johnson Dismantling Joint St. St. 316 DN250 PN25	SMA/Viking Johnson	Yes	ea	10.00	Yes	Good	Yes	-
140	Viking Johnson Dismantling Joint St. St. 316 DN250 PN16	SMA/Viking Johnson	Yes	ea	6.00	Yes	Good	Yes	-

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141	Viking Johnson Dismantling Joint St. St. 316 DN250 PN25	SMA/Viking Johnson	Yes	ea	4.00	Yes	Good	Yes	-
142	Viking Johnson Dismantling Joint St. St. 316 DN200 PN25	SMA/Viking Johnson	Yes	ea	9.00	Yes	Good	Yes	-
143	Viking Johnson Dismantling Joint St. St. 316 DN200 PN16	SMA/Viking Johnson	Yes	ea	13.00	Yes	Good	Yes	-
144	Viking Johnson Dismantling Joint St. St. 316 DN150 PN16	SMA/Viking Johnson	Yes	ea	16.00	Yes	Good	Yes	-
145	Viking Johnson Dismantling Joint Gal. Steel DN100 PN16	SMA/Viking Johnson	Yes	ea	12.00	Yes	Good	Yes	-
146	Viking Johnson Dismantling Joint St. St. 316 DN150 PN25	SMA/Viking Johnson	Yes	ea	8.00	Yes	Good	Yes	-
147	Viking Johnson Dismantling Joint Gal. Steel DN100 PN25	SMA/Viking Johnson	Yes	ea	13.00	Yes	Good	Yes	-
148	Viking Johnson Dismantling Joint St. St. 316 DN100 PN25	SMA/Viking Johnson	Yes	ea	3.00	Yes	Good	Yes	-
149	Viking Johnson Dismantling Joint Gal. Steel DN80 PN16/25	SMA/Viking Johnson	Yes	ea	31.00	Yes	Good	Yes	-
150	Viking Johnson Dismantling Joint Gal. Steel DN80 PN16/25	SMA/Viking Johnson	Yes	ea	34.00	Yes	Good	Yes	-
151	Viking Johnson Dismantling Joint Gal. Steel DN50 PN16/25	SMA/Viking Johnson	Yes	ea	30.00	Yes	Good	Yes	-
152	Viking Johnson Dismantling Joint Gal. Steel DN50 PN16/25	SMA/Viking Johnson	Yes	ea	27.00	Yes	Good	Yes	-
153	Viking Johnson Dismantling Joint St. St. 316 DN80 PN16/25	SMA/Viking Johnson	Yes	ea	7.00	Yes	Good	Yes	-
154	Viking Johnson Dismantling Joint Gal. Steel DN50 PN16/25	SMA/Viking Johnson	Yes	ea	34.00	Yes	Good	Yes	-
155	Viking Johnson Dismantling Joint Gal. Steel DN50 PN16/25	SMA/Viking Johnson	Yes	ea	31.00	Yes	Good	Yes	-

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156	Viking Johnson Dismantling Joint St. St. 316 DN50 PN16/25	SMA/Viking Johnson	Yes	ea	13.00	Yes	Good	Yes	-
157	Viking Johnson Dismantling Joint Gal. Steel DN100 PN16	SMA/Viking Johnson	Yes	ea	28.00	Yes	Good	Yes	-
158	Viking Johnson Dismantling Joint St. St. 316 DN100 PN16	SMA/Viking Johnson	Yes	ea	2.00	Yes	Good	Yes	-
159	AFM 34 - Reinz Flange Gaskets DN50 PN16/25	SMA	Yes	ea	457.00	Yes	Fair	No	All Gaskets were stored in normal weather condition. It is very risky to use them
160	AFM 34 - Reinz Flange Gaskets DN80 PN16/25	SMA	Yes	ea	325.00	Yes	Fair	No	
161	AFM 34 - Reinz Flange Gaskets DN100 PN16	SMA	Yes	ea	192.00	Yes	Fair	No	
162	AFM 34 - Reinz Flange Gaskets DN150 PN16	SMA	Yes	ea	66.00	Yes	Fair	No	
163	AFM 34 - Reinz Flange Gaskets DN200 PN16	SMA	Yes	ea	62.00	Yes	Fair	No	
164	AFM 34 - Reinz Flange Gaskets DN250 PN16	SMA	Yes	ea	38.00	Yes	Fair	No	
165	AFM 34 - Reinz Flange Gaskets DN300 PN16	SMA	Yes	ea	84.00	Yes	Fair	No	
166	AFM 34 - Reinz Flange Gaskets DN100 PN25	SMA	Yes	ea	83.00	Yes	Fair	No	
167	AFM 34 - Reinz Flange Gaskets DN150 PN25	SMA	Yes	ea	40.00	Yes	Fair	No	
168	AFM 34 - Reinz Flange Gaskets DN200 PN25	SMA	Yes	ea	40.00	Yes	Fair	No	
169	AFM 34 - Reinz Flange Gaskets DN250 PN25	SMA	Yes	ea	85.00	Yes	Fair	No	
170	AFM 34 - Reinz Flange Gaskets DN300 PN25	SMA	Yes	ea	24.00	Yes	Fair	No	
171	AFM 34 - Reinz Flange Gaskets DN100 PN6	SMA	Yes	ea	2.00	Yes	Fair	No	
172	Steel Flange Hubbed Slip on Type12 DN50 PN16	SMA	Yes	ea	233.00	Yes	Fair	Yes	
173	Steel Flange Hubbed Slip on Type12 DN50 PN25	SMA	Yes	ea	18.00	Yes	Fair	Yes	Sand Blasting is required
174	Steel Flange Weld Neck Type 11 DN50 PN16	SMA	Yes	ea	25.00	Yes	Fair	Yes	Sand Blasting is required

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175	Steel Flange Hubbed Slip on Type12 DN50 PN16	SMA	Yes	ea	6.00	Yes	Fair	Yes	Sand Blasting is required
176	Steel Flange Hubbed Slip on Type12 DN80 PN16	SMA	Yes	ea	1.00	Yes	Fair	Yes	Sand Blasting is required
177	Steel Flange Hubbed Slip on Type12 DN100 PN16	SMA	Yes	ea	2.00	Yes	Fair	Yes	Sand Blasting is required
178	Steel Flange Hubbed Slip on Type12 DN150 PN16	SMA	Yes	ea	4.00	Yes	Fair	Yes	Sand Blasting is required
179	Steel Flange Hubbed Slip on Type12 DN200 PN16	SMA	Yes	ea	26.00	Yes	Fair	Yes	Sand Blasting is required
180	Steel Flange Hubbed Slip on Type12 DN200 PN25	SMA	Yes	ea	21.00	Yes	Fair	Yes	Sand Blasting is required
181	Steel Flange Weld Neck Type 11 DN80 PN16	SMA	Yes	ea	10.00	Yes	Fair	Yes	Sand Blasting is required
182	Steel Flange Weld Neck Type 11 DN80 PN25	SMA	Yes	ea	4.00	Yes	Fair	Yes	Sand Blasting is required
183	Steel Blind Flange DN50 PN16	SMA	Yes	ea	20.00	Yes	Fair	Yes	Sand Blasting is required
184	Steel Blind Flange DN80 PN16	SMA	Yes	ea	4.00	Yes	Fair	Yes	Sand Blasting is required
185	Steel Blind Flange DN100 PN16	SMA	Yes	ea	4.00	Yes	Fair	Yes	Sand Blasting is required
186	Steel Blind Flange DN150 PN16	SMA	Yes	ea	2.00	Yes	Fair	Yes	Sand Blasting is required
187	Steel Blind Flange DN250 PN16	SMA	Yes	ea	1.00	Yes	Fair	Yes	Sand Blasting is required
188	Steel Blind Flange DN300 PN16	SMA	Yes	ea	1.00	Yes	Fair	Yes	Sand Blasting is required
189	Steel Blind Flange DN80 PN25	SMA	Yes	ea	5.00	Yes	Fair	Yes	Sand Blasting is required
190	Steel Blind Flange DN100 PN25	SMA	Yes	ea	4.00	Yes	Fair	Yes	Sand Blasting is required
191	Steel Flange Hubbed Slip on Type12 DN80 PN16	SMA	Yes	ea	62.00	Yes	Fair	Yes	Sand Blasting is required
192	Steel Flange Hubbed Slip on Type12 DN80 PN25	SMA	Yes	ea	50.00	Yes	Fair	Yes	Sand Blasting is required
193	Steel Flange Hubbed Slip on Type12 DN100 PN16	SMA	Yes	ea	74.00	Yes	Fair	Yes	Sand Blasting is required

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194	Steel Flange Hubbed Slip on Type12 DN150 PN16	SMA	Yes	ea	17.00	Yes	Fair	Yes	Sand Blasting is required
195	Steel Flange Hubbed Slip on Type12 DN150 PN25	SMA	Yes	ea	8.00	Yes	Fair	Yes	Sand Blasting is required
196	Steel Flange Hubbed Slip on Type12 DN250 PN16	SMA	Yes	ea	22.00	Yes	Fair	Yes	Sand Blasting is required
197	Steel Flange Hubbed Slip on Type12 DN250 PN25	SMA	Yes	ea	23.00	Yes	Fair	Yes	Sand Blasting is required
198	Steel Flange Hubbed Slip on Type12 DN100 PN25	SMA	Yes	ea	54.00	Yes	Fair	Yes	Sand Blasting is required
199	Steel Flanges for Chambers Vents DN100 BS10	SMA	Yes	ea	205.00	Yes	Fair	Yes	Sand Blasting is required
200	Steel Flange Hubbed Slip on Type12 DN300 PN16	SMA	Yes	ea	52.00	Yes	Fair	Yes	Sand Blasting is required
201	Steel Flange Hubbed Slip on Type12 DN150 PN25	SMA	Yes	ea	16.00	Yes	Fair	Yes	Sand Blasting is required
202	Steel Flange Hubbed Slip on Type12 DN250 PN25	SMA	Yes	ea	30.00	Yes	Fair	Yes	Sand Blasting is required
203	Steel Flange Hubbed Slip on Type12 DN300 PN25	SMA	Yes	ea	10.00	Yes	Fair	Yes	Sand Blasting is required
204	Steel Flange for Vents ISO7005 DN100 PN16	SMA	Yes	ea	74.00	Yes	Fair	Yes	Sand Blasting is required
205	Steel Flange for Vents ISO7005 DN100 PN6	SMA	Yes	ea	54.00	Yes	Fair	Yes	Sand Blasting is required
206	Stud Bolts FT M16 - 2.0P x 1 meter DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	22.00	Yes	Good	Yes	-
207	Hex Nut M16 - 2.0P DIN 934 Bright A194M 8M	SMA	Yes	ea	396.00	Yes	Good	Yes	-
208	Flat Washers M16 DIN 125 Bright 316	SMA	Yes	ea	396.00	Yes	Good	Yes	-
209	Stud Bolts FT M20 - 2.5P X 1 meter DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	10.00	Yes	Good	Yes	-
210	Hex Nut M20 - 2.5P DIN 934 Bright A194M 8M	SMA	Yes	ea	160.00	Yes	Good	Yes	-
211	Flat Washers M20 DIN 125 Bright 316	SMA	Yes	ea	160.00	Yes	Good	Yes	-

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212	Stud Bolt FT M24 - 3.0P X 1 meter DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	10.00	Yes	Good	Yes	-
213	Hex Nut M24 - 3.0P DIN 934 Bright A194M 8M	SMA	Yes	ea	150.00	Yes	Good	Yes	-
214	Flat Washers M24 DIN 125 Bright 316	SMA	Yes	ea	150.00	Yes	Good	Yes	-
215	Stud Bolt FT M27 - 3.0P X 1 meter DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	8.00	Yes	Good	Yes	-
216	Hex Nut M27 - 3.0P DIN 934 Bright A194M 8M	SMA	Yes	ea	112.00	Yes	Good	Yes	-
217	Flat Washers M27 DIN 125 Bright 316	SMA	Yes	ea	112.00	Yes	Good	Yes	-
218	Hex Bolt FT M16 - 2.0P Hot Dip Gal. Gr. 8.8 Hot Gal. Steel	SMA	Yes	ea	830.00	Yes	Good	Yes	-
219	Hex Nut M16 - 2.0P Hot Dip Gal. Steel	SMA	Yes	ea	830.00	Yes	Good	Yes	-
220	Flat Washers M16 Hot Dip Gal. Steel	SMA	Yes	ea	830.00	Yes	Good	Yes	-
221	Hex Bolt FT M16 - 2.0P X 90MM DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	3,105.00	Yes	Good	Yes	-
222	Hex Nut M16 - 2.0P DIN 934 Bright A194M 8M	SMA	Yes	ea	3,105.00	Yes	Good	Yes	-
223	Flat Washers M16 DIN 125 Bright 316	SMA	Yes	ea	6,210.00	Yes	Good	Yes	-
224	Hex Bolt FT M20 - 2.5P X 96MM DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	1,350.00	Yes	Good	Yes	-
225	Hex Nut M20 - 2.5P DIN 934 Bright A194M 8M	SMA	Yes	ea	1,350.00	Yes	Good	Yes	-
226	Flat Washers M20 DIN 125 Bright 316	SMA	Yes	ea	2,700.00	Yes	Good	Yes	-
227	Hex Bolt FT M24 - 3.0P X 112MM DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	1,440.00	Yes	Good	Yes	-

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228	Hex Nut M24 - 3.0P DIN 934 Bright A194M 8M	SMA	Yes	ea	1,440.00	Yes	Good	Yes	-
229	Flat Washers M24 DIN 125 Bright 316	SMA	Yes	ea	2,880.00	Yes	Good	Yes	-
230	Hex Bolt FT M24 - 3.0P X 112MM DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	70.00	Yes	Good	Yes	-
231	Hex Bolt FT M27 - 3.0P X 123MM DIN 933 Bright A193M B8M Cl.2	SMA	Yes	ea	1,240.00	Yes	Good	Yes	-
232	Hex Nut M27 - 3.0P DIN 934 Bright A194M 8M	SMA	Yes	ea	1,240.00	Yes	Good	Yes	-
233	Flat Washers M27 DIN 125 Bright 316	SMA	Yes	ea	2,480.00	Yes	Good	Yes	-
234	US pressure Gauges with snubbers and BSPT x NPT adaptor PN 0-16	Keyroc	Yes	ea	5.00	Yes	Good	Yes	-
235	US pressure Gauges with snubbers and BSPT x NPT adaptor PN 0-25	Keyroc	Yes	ea	24.00	Yes	Good	Yes	-
236	Anti Seize for Bolts 0.5KG	SMA	Yes	Box	10.00	Yes	Good	Yes	-
237	2" Gate valves for fire hydrant	ABC	Yes	ea	2.00	Yes	Good	Yes	-
238	Hose reel for fire hydrant	ABC	Yes	ea	4.00	Yes	Good	Yes	-
239	Cabinet	ABC	Yes	ea	4.00	Yes	Good	Yes	-
240	Lighting poles octagonal 6M	Nasserco/Amaria	Yes	ea	10.00	Yes	Good	Yes	-
241	Electrical pullboxes 60X60	Nasserco/Al Ameer	Yes	ea	1.00	Yes	Good	Yes	-
242	Electrical pullboxes 60X60	Nasserco/Al Ameer	Yes	ea	1.00	Yes	Good	Yes	-
243	Electrical pullboxes 60X60	Nasserco/Al Ameer	Yes	ea	1.00	Yes	Good	Yes	-
244	Butterfly Valves - McWane DN300 PN16	SMA/McWane	Yes	ea	6.00	Yes	Good	Yes	-
245	Butterfly Valves - McWane DN300 PN16	SMA/McWane	Yes	ea	6.00	Yes	Good	Yes	-
246	Butterfly Valves - McWane DN300 PN16	SMA/McWane	Yes	ea	6.00	Yes	Good	Yes	-

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247	Butterfly Valves - McWane DN300 PN16	SMA/McWane	Yes	ea	5.00	Yes	Good	Yes	-
248	Butterfly Valves - Mueller DN300 PN25	SMA/Mueller	Yes	ea	7.00	Yes	Good	Yes	-
249	Air Valve - VAG with surge check DN80 PN25	SMA/VAG	Yes	ea	28.00	Yes	Good	Yes	-
250	Air Valve - VAG with surge check PN100 DN25	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
251	Air Valve for Reservoir - ARI Without surge check (Low Pressure) DN80 PN6	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
252	Air Valve for Reservoir - ARI Without surge check (Low Pressure) DN80 PN6	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
253	NIBCO Gate Valve With Position Ind. & Handwheel DN80 PN25	S.AL/NIBCO	Yes	ea	10.00	Yes	Good	Yes	-
254	NIBCO Gate Valve With Position Ind. & Handwheel DN150 PN25	S.AL/NIBCO	Yes	ea	8.00	Yes	Good	Yes	-
255	NIBCO Gate Valve With Position Ind. & Handwheel DN200 PN25	S.AL/NIBCO	Yes	ea	9.00	Yes	Good	Yes	-
256	NIBCO Gate Valve With Position Ind. & Handwheel DN200 PN25	S.AL/NIBCO	Yes	ea	2.00	Yes	Good	Yes	-
257	NIBCO Gate Valve With Position Ind. & Handwheel DN250 PN25	S.AL/NIBCO	Yes	ea	4.00	Yes	Good	Yes	-
258	NIBCO Gate Valve With Position Ind. & Handwheel DN250 PN25	S.AL/NIBCO	Yes	ea	6.00	Yes	Good	Yes	-
259	NIBCO Gate Valve With Position Ind. & Handwheel DN250 PN25	S.AL/NIBCO	Yes	ea	4.00	Yes	Good	Yes	-
260	Check Valve - ARI - YATTA- SAM-SVC-CV-4814 DN250 PN25	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
261	Check Valve - ARI - YATTA-DM-CV-115 DN250 PN25	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
262	Check Valve - ARI - YATTA-SR-CV-902 DN300 PN16	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
263	Check Valve - ARI - YATTA-DM-CV-301 DN200 PN16	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
264	Check Valve - ARI - YATTA-AHR-CV-1102 DN300 PN16	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
265	Check Valve - ARI - YATTA-AHR-CV-1201 DN300 PN16	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
266	Check Valve - ARI - YATTA-BE-SVC-CV-4514 DN100 PN25	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
267	Check Valve - ARI - YATTA-ARH-SVC-CV-5014 DN100 PN25	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
268	Check Valve - ARI - YATTA-ZIF-SVC-CV-4714 DN150 PN25	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
269	Check Valve - ARI - YATTA-ZIF-SVC-CV-4614 DN250 PN25	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
270	Check Valve - ARI - YATTA-ARH-SVC-CV-4914 DN250 PN25	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
271	Check Valve - ARI - YATTA-DM-CV-205 DN250 PN25	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
272	Check Valve - ARI - YATTA-SR-CV-1001 DN300 PN16	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
273	Check Valve - ARI - YATTA-DM-CV-103 DN300 PN16	SMA/ARI	Yes	ea	1.00	Yes	Good	Yes	-
274	Gate Valve GV-2 with Position Ind. & Handwheel DN50 PN16	SMA/VAG	Yes	ea	20.00	Yes	Good	Yes	-
275	Gate Valve GV-2 with Position Ind. & Handwheel DN50 PN16	SMA/VAG	Yes	ea	24.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
276	Gate Valve GV-2 with Position Ind. & Handwheel DN50 PN16	SMA/VAG	Yes	ea	18.00	Yes	Good	Yes	-
277	Gate Valve GV-2 with Position Ind. & Handwheel DN50 PN16	SMA/VAG	Yes	ea	12.00	Yes	Good	Yes	-
278	Gate Valve GV-2 with Position Ind. & Handwheel DN100 PN16	SMA/VAG	Yes	ea	4.00	Yes	Good	Yes	-
279	Gate Valve GV-2 with Position Ind. & Handwheel DN150 PN16	SMA/VAG	Yes	ea	2.00	Yes	Good	Yes	-
280	Gate Valve GV-2 with Position Ind. & Handwheel DN50 PN16	SMA/VAG	Yes	ea	11.00	Yes	Good	Yes	-
281	Gate Valve GV-2 with Position Ind. & Handwheel DN80 PN16	SMA/VAG	Yes	ea	3.00	Yes	Good	Yes	-
282	Gate Valve GV-2 with Position Ind. & Handwheel DN80 PN16	SMA/VAG	Yes	ea	25.00	Yes	Good	Yes	-
283	Gate Valve GV-2 with Position Ind. & Handwheel DN80 PN16	SMA/VAG	Yes	ea	22.00	Yes	Good	Yes	-
284	Gate Valve GV-2 with Position Ind. & Handwheel DN100 PN16	SMA/VAG	Yes	ea	8.00	Yes	Good	Yes	-
285	Gate Valve GV-2 with Position Ind. & Handwheel DN100 PN16	SMA/VAG	Yes	ea	7.00	Yes	Good	Yes	-
286	Gate Valve GV-2 with Position Ind. & Handwheel DN150 PN16	SMA/VAG	Yes	ea	5.00	Yes	Good	Yes	-
287	Gate Valve GV-2 with Position Ind. & Handwheel DN150 PN16	SMA/VAG	Yes	ea	4.00	Yes	Good	Yes	-
288	Gate Valve GV-2 with Position Ind. & Handwheel DN200 PN16	SMA/VAG	Yes	ea	6.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model/Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
289	Gate Valve GV-2 with Position Ind. & Handwheel DN200 PN16	SMA/VAG	Yes	ea	3.00	Yes	Good	Yes	-
290	Gate Valve GV-2 with Position Ind. & Handwheel DN200 PN16	SMA/VAG	Yes	ea	3.00	Yes	Good	Yes	-
291	Gate Valve GV-2 with Position Ind. & Handwheel DN250 PN16	SMA/VAG	Yes	ea	2.00	Yes	Good	Yes	-
292	Gate Valve GV-2 with Position Ind. & Handwheel DN250 PN16	SMA/VAG	Yes	ea	3.00	Yes	Good	Yes	-
293	Gate Valve GV-2 with Position Ind. & Handwheel DN250 PN16	SMA/VAG	Yes	ea	2.00	Yes	Good	Yes	-
294	1" Pipes SCH40 3LPE HDG	FIP	Yes	lm	595.98	Yes	Good	Yes	-
295	1" Pipes SCH40 3LPE HDG	FIP	Yes	lm	12.34	Yes	Good	Yes	-
296	2" Pipes SCH40 3LPE HDG	FIP	Yes	lm	788.62	Yes	Good	Yes	-
297	2" Pipes SCH40 3LPE HDG	FIP	Yes	lm	84.41	Yes	Good	Yes	-
298	2" Pipes SCH40 FBE HDG	FIP	Yes	lm	108.36	Yes	Good	Yes	-
299	2" Pipes SCH40 FBE HDG	FIP	Yes	lm	4.58	Yes	Good	Yes	-
300	3" Pipes SCH40 3LPE Cement lined	FIP	Yes	lm	1,207.80	No	Good	Yes	The quantities are less than the length provided by PWA. In addition, 450m of the pipes shall not be used due to break in cement lining.
301	3" Pipes SCH40 3LPE Cement lined	FIP	Yes	lm	48.00	Yes	Good	Yes	
302	3" Pipes SCH40 Black/Black	FIP	Yes	lm	9.51	Yes	Good	Yes	
303	3" Pipes SCH40 FBE Cement lined	FIP	Yes	lm	109.80	Yes	Good	Yes	
304	3" Pipes SCH40 FBE Cement lined	FIP	Yes	lm	8.91	Yes	Good	Yes	
305	3" Pipes SCH40 3LPE Black	FIP	Yes	lm	97.60	Yes	Good	Yes	
306	4" Pipes SCH40 3LPE Black	FIP	Yes	lm	117.92	Yes	Good	Yes	
307	4" Pipes SCH40 3LPE Cement lined	FIP	Yes	lm	1,146.80	Yes	Good	Yes	
308	4" Pipes SCH40 3LPE Cement lined	FIP	Yes	lm	147.30	Yes	Good	Yes	
309	4" Pipes SCH40 HDG/HDG	FIP	Yes	lm	17.55	Yes	Good	Yes	

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
310	4" Pipes SCH40 HDG/HDG	FIP	Yes	lm	12.70	Yes	Good	Yes	The quantities are less than the length provided by PWA. In addition, 450m of the pipes shall not be used due to cracks in cement lining.
311	4" Pipes SCH40 FBE Cement lined	FIP	Yes	lm	122.00	Yes	Good	Yes	
312	4" Pipes SCH40 FBE Cement lined	FIP	Yes	lm	30.10	Yes	Good	Yes	
313	6" Pipes 6.35MM 3LPE Cement lined	FIP	Yes	lm	1,244.40	Yes	Good	Yes	310 m of the pipes are in bad conditions due to cracks in cement lining.
314	6" Pipes 6.35MM 3LPE Cement lined	FIP	Yes	lm	114.84	Yes	Good	Yes	
315	6" Pipes 6.35MM FBE Cement lined	FIP	Yes	lm	12.20	Yes	Good	Yes	
316	6" Pipes 6.35MM FBE Cement lined	FIP	Yes	lm	95.80	Yes	Good	Yes	
317	6" Pipes 6.35MM FBE Black	FIP	Yes	lm	17.00	Yes	Good	Yes	
318	6" Pipes 6.35MM Black/Black	FIP	Yes	lm	12.60	Yes	Good	Yes	
319	8" Pipes 6.35MM 3LPE Cement lined	FIP	Yes	lm	256.20	Yes	Good	Yes	-
320	8" Pipes 6.35MM 3LPE Cement lined	FIP	Yes	lm	100.41	Yes	Good	Yes	-
321	8" Pipes SCH40 3LPE Cement lined	FIP	Yes	lm	63.80	Yes	Good	Yes	-
322	8" Pipes 6.35MM FBE Cement lined	FIP	Yes	lm	73.20	Yes	Good	Yes	-
323	8" Pipes 6.35MM FBE Cement lined	FIP	Yes	lm	9.46	Yes	Good	Yes	-
324	8" Pipes 6.35MM Black/Black	FIP	Yes	lm	46.13	Yes	Good	Yes	-
325	10" Pipes SCH40 3LPE Cement lined	FIP	Yes	lm	11.60	Yes	Good	Yes	-
326	10" Pipes SCH40 FBE Black	FIP	Yes	lm	9.20	Yes	Good	Yes	-
327	10" Pipes SCH40 FBE Cement lined	FIP	Yes	lm	36.60	Yes	Good	Yes	-
328	10" Pipes SCH40 FBE Cement lined	FIP	Yes	lm	23.79	Yes	Good	Yes	-
329	10" Pipes 6.35mm 3LPE Cement lined	FIP	Yes	lm	36.60	Yes	Good	Yes	-
330	10" Pipes 6.35mm 3LPE Cement lined	FIP	Yes	lm	24.74	Yes			

No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
331	10" Pipes 6.35mm Black/Black	FIP	Yes	lm	11.58	Yes	Good	Yes	-
332	12" Pipes 6.35mm 3LPE Cement lined	FIP	Yes	lm	353.80	Yes	Good	Yes	-
333	12" Pipes 6.35mm 3LPE Cement lined	FIP	Yes	lm	112.46	Yes	Good	Yes	-
334	12" Pipes SCH40 3LPE Cement lined	FIP	Yes	lm	64.35	Yes	Good	Yes	-
335	12" Pipes SCH40 3LPE Cement lined	FIP	Yes	lm	8.80	Yes	Good	Yes	-
336	12" Pipes 6.35mm FBE Black	FIP	Yes	lm	3.18	Yes	Good	Yes	-
337	12" Pipes SCH40 FBE Cement lined	FIP	Yes	lm	105.30	Yes	Good	Yes	-
338	12" Pipes SCH40 FBE Cement lined	FIP	Yes	lm	9.26	Yes	Good	Yes	-
339	12" Pipes 6.35mm Black/Black	FIP	Yes	lm	11.69	Yes	Good	Yes	-
340	Strainer YATTA-ZIF-SVC- STR-4602 DN250 PN25	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
341	Strainer YATTA-SCH-RES- STR-4402 DN300 PN16	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
342	Strainer YATTA-YAT-DS- PRV-STR-BP-1000 DN50 PN16	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
343	Strainer YATTA-YAT-DS- PRV-STR-BP-1001 DN50 PN16	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
344	Strainer YATTA-YAT-DS- PRV-STR-BP-1002 DN50 PN16	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
345	Strainer YATTA-YAT-DS- PRV-STR-1000 DN80 PN16	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
346	Strainer YATTA-YAT-DS- PRV-STR-1001 DN80 PN16	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
347	Strainer YATTA-YAT-DS- PRV-STR-1002 DN80 PN16	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
348	Strainer YATTA-BE-SVC- STR-4502 DN100 PN25	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model# /Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
349	Strainer YATTA-ARH-SVC-STR-5002 DN100 PN25	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
350	Strainer YATTA-BE-RES-STR-4202 DN150 PN25	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
351	Strainer YATTA-ZIF-SVC-STR-4702 DN150 PN25	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
352	Strainer YATTA-KHS-RES-STR-4302 DN250 PN16	SMA/VAG	Yes	ea	1.00	Yes	Good	Yes	-
353	20" Steel Reducing Coupling, Alloy bolts and nuts 350 PSI - Romac RC400DRG- 21.60 x 20.00 steel - 20.00 Plain End For Welding	ABC/ROMAC	Yes	ea	6.00	Yes	Good	Yes	-
354	20" Steel Reducing Coupling, Alloy bolts and nuts 350 PSI - Romac RC400DRG- 21.60 x 20.00 steel - 20.00 Plain End For Welding	ABC/ROMAC	Yes	ea	1.00	Yes	Good	Yes	-
355	20" Steel Reducing Coupling, Alloy bolts and nuts 350 PSI - Romac RC400DRG- 21.60 x 20.00 steel - 20.00 Plain End For Welding	ABC/ROMAC	Yes	ea	1.00	Yes	Good	Yes	-
356	20" Steel Reducing Coupling, Alloy bolts and nuts 350 PSI - Romac RC400DRG- 21.60 x 20.00 steel - 20.00 Plain End For Welding	ABC/ROMAC	Yes	ea	1.00	Yes	Good	Yes	-
357	24" Steel Reducing Coupling, Alloy bolts and nuts 350 PSI - Romac RC400- 25.00P x 24.00 Steel - 24.00 Plain End for Welding	ABC/ROMAC	Yes	ea	2.00	Yes	Good	Yes	-
358	20" Steel Reducing Coupling, Alloy bolts and nuts 350 PSI	ABC/ROMAC	Yes	ea	2.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model# /Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
	- Romac RC400DRG- 21.60 x 20.00 steel - 20.00 Plain End For Welding								
359	Flexicraft Expansion Joint DN200 Class 150	SMA/Flexicraft	Yes	ea	1.00	Yes	Good	Yes	-
360	Flexicraft Expansion Joint DN250 PN16	SMA/Flexicraft	Yes	ea	1.00	Yes	Good	Yes	-
361	Flexicraft Expansion Joint DN300 PN16	SMA/Flexicraft	Yes	ea	1.00	Yes	Good	Yes	-
362	Tee 8" x 8"	FIP	Yes	ea	13.00	Yes	Fair	Yes	Cleaning, repair and insulating are required.
363	Tee 8" x 3"	FIP	Yes	ea	7.00	Yes	Fair	Yes	
364	Tee 8" x 4"	FIP	Yes	ea	5.00	Yes	Fair	Yes	
365	Tee 8" x 6"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
366	Tee 6" x 2"	FIP	Yes	ea	16.00	Yes	Fair	Yes	
367	Tee 6" x 4"	FIP	Yes	ea	26.00	Yes	Fair	Yes	
368	Tee 6" x 3"	FIP	Yes	ea	17.00	Yes	Fair	Yes	
369	8" Elbow 45 Long Radius	FIP	Yes	ea	6.00	Yes	Fair	Yes	
370	6" Elbow 45 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
371	6" Elbow 90 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
372	10" Elbow 45 Long Radius	FIP	Yes	ea	10.00	Yes	Fair	Yes	
373	8" Elbow 45 Long Radius	FIP	Yes	ea	16.00	Yes	Fair	Yes	
374	6" Elbow 45 Long Radius	FIP	Yes	ea	63.00	Yes	Fair	Yes	
375	4" Elbow 45	FIP	Yes	ea	53.00	Yes	Fair	Yes	
376	3" Elbow 45	FIP	Yes	ea	75.00	Yes	Fair	Yes	
377	4" Elbow 90 Long Radius	FIP	Yes	ea	11.00	Yes	Fair	Yes	
378	3" Elbow 90 Long Radius	FIP	Yes	ea	12.00	Yes	Fair	Yes	
379	Tee 12" x 12"	FIP	Yes	ea	4.00	Yes	Fair	Yes	
380	Tee 12" x 6"	FIP	Yes	ea	3.00	Yes	Fair	Yes	
381	Tee 12" x 10"	FIP	Yes	ea	2.00	Yes	Fair	Yes	
382	Tee 10" x 8"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
383	Tee 10" x 6"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
384	Tee 6" x 2"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
385	10" Elbow 45 Long Radius	FIP	Yes	ea	11.00	Yes	Fair	Yes	

No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
386	12" Elbow 45 Long Radius	FIP	Yes	ea	3.00	Yes	Fair	Yes	Cleaning, repair and insulating are required.
387	8" Elbow 45 Long Radius	FIP	Yes	ea	2.00	Yes	Fair	Yes	
388	Tee 3" x 3"	FIP	Yes	ea	5.00	Yes	Fair	Yes	
389	Concentric Reducer 12" x 8"	FIP	Yes	ea	2.00	Yes	Fair	Yes	
390	Concentric Reducer 6" x 4"	FIP	Yes	ea	24.00	Yes	Fair	Yes	
391	Concentric Reducer 10" x 8"	FIP	Yes	ea	2.00	Yes	Fair	Yes	
392	Concentric Reducer 8" x 6"	FIP	Yes	ea	10.00	Yes	Fair	Yes	
393	Concentric Reducer 10" x 6"	FIP	Yes	ea	2.00	Yes	Fair	Yes	
394	Concentric Reducer 12" x 6"	FIP	Yes	ea	2.00	Yes	Fair	Yes	
395	Concentric Reducer 12" x 10"	FIP	Yes	ea	4.00	Yes	Fair	Yes	
396	Concentric Reducer 12" x 4"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
397	Eccentric Reducer 4" x 3"	FIP	Yes	ea	9.00	Yes	Fair	Yes	
398	Concentric Reducer 4" x 3"	FIP	Yes	ea	4.00	Yes	Fair	Yes	
399	Concentric Reducer 3" x 2"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
400	6" Elbow 90 Long Radius	FIP	Yes	ea	7.00	Yes	Fair	Yes	
401	10" Elbow 90 Long Radius	FIP	Yes	ea	9.00	Yes	Fair	Yes	
402	8" Elbow 90 Long Radius	FIP	Yes	ea	18.00	Yes	Fair	Yes	
403	Concentric Reducer 12" x 4"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
404	6" Elbow 45 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
405	8" Elbow 45 Long Radius	FIP	Yes	ea	3.00	Yes	Fair	Yes	
406	12" Elbow 45 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
407	2" Elbow 90 Long Radius	FIP	Yes	ea	6.00	Yes	Fair	Yes	
408	12" Elbow 90 Long Radius	FIP	Yes	ea	4.00	Yes	Fair	Yes	
409	10" Elbow 90 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
410	3" Saddle	FIP	Yes	ea	6.00	Yes	Fair	Yes	
411	12" Elbow 45 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
412	3" Elbow 90 Long Radius	FIP	Yes	ea	6.00	Yes	Fair	Yes	
413	8" Elbow 90 Long Radius	FIP	Yes	ea	8.00	Yes	Fair	Yes	
414	Tee 10" x 6"	FIP	Yes	ea	2.00	Yes	Fair	Yes	
415	Tee 12" x 10"	FIP	Yes	ea	2.00	Yes	Fair	Yes	
416	Tee 8" x 8"	FIP	Yes	ea	3.00	Yes	Fair	Yes	
417	12" Elbow 90 Long Radius	FIP	Yes	ea	5.00	Yes	Fair	Yes	

# Assessment Report- Yatta Water Supply Project

No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
418	8" Elbow 45 Long Radius	FIP	Yes	ea	29.00	Yes	Fair	Yes	Cleaning, repair and insulating are required.
419	10" Elbow 45 Long Radius	FIP	Yes	ea	5.00	Yes	Fair	Yes	
420	12" Elbow 90 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
421	Tee 12" x 4"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
422	Tee 10" x 4"	FIP	Yes	ea	9.00	Yes	Fair	Yes	
423	Tee 10" x 8"	FIP	Yes	ea	9.00	Yes	Fair	Yes	
424	Tee 10" x 6"	FIP	Yes	ea	4.00	Yes	Fair	Yes	
425	8" Elbow 90 Long Radius	FIP	Yes	ea	6.00	Yes	Fair	Yes	
426	10" Elbow 90 Long Radius	FIP	Yes	ea	5.00	Yes	Fair	Yes	
427	Concentric Reducer 10" x 6"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
428	Concentric Reducer 4" x 2"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
429	10" Elbow 45 Long Radius	FIP	Yes	ea	3.00	Yes	Fair	Yes	
430	6" Elbow 45 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
431	12" Elbow 90 Long Radius	FIP	Yes	ea	2.00	Yes	Fair	Yes	
432	4" Elbow 90 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
433	8" Elbow 90 Long Radius	FIP	Yes	ea	1.00	Yes	Fair	Yes	
434	Tee 3" x 2"	FIP	Yes	ea	3.00	Yes	Fair	Yes	
435	Tee 4" x 3"	FIP	Yes	ea	1.00	Yes	Fair	Yes	
436	Tee 6" x 6"	FIP	Yes	ea	13.00	Yes	Fair	Yes	
437	Tee 4" x 4"	FIP	Yes	ea	3.00	Yes	Fair	Yes	
438	Tee 4" x 3"	FIP	Yes	ea	10.00	Yes	Fair	Yes	
439	Tee 3" x 3"	FIP	Yes	ea	21.00	Yes	Fair	Yes	
440	Tee 3" x 2"	FIP	Yes	ea	5.00	Yes	Fair	Yes	
441	4" Steel Elbow 90 for ventilation pipe	FIP	Yes	ea	201.00	Yes	Fair	Yes	
442	Tee for ventilation pipe 4" x 4"	FIP	Yes	ea	7.00	Yes	Fair	Yes	
443	2" Threaded Coupling	SMA/George Fischer	Yes	ea	29.00	Yes	Fair	Yes	
444	1.5" Threaded Coupling	SMA/George Fischer	Yes	ea	51.00	Yes	Fair	Yes	
445	1" Threaded Coupling	SMA/George Fischer	Yes	ea	19.00	Yes	Fair	Yes	

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model# /Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
446	1/2" Threaded Coupling	SMA/George Fischer	Yes	ea	0.00	Yes	Fair	Yes	Cleaning, repair and insulating are required.
447	3/4" Threaded Coupling	SMA/George Fischer	Yes	ea	9.00	Yes	Fair	Yes	
448	2" Threaded Elbow 45	SMA/George Fischer	Yes	ea	84.00	Yes	Fair	Yes	
449	1.5" Threaded Elbow 45	SMA/George Fischer	Yes	ea	31.00	Yes	Fair	Yes	
450	1" Threaded Elbow 45	SMA/George Fischer	Yes	ea	42.00	Yes	Fair	Yes	
451	3/4" Threaded Elbow 45	SMA/George Fischer	Yes	ea	102.00	Yes	Fair	Yes	
452	1.5" Threaded Elbow 90	SMA/George Fischer	Yes	ea	22.00	Yes	Fair	Yes	
453	1" Threaded Elbow 90	SMA/George Fischer	Yes	ea	30.00	Yes	Fair	Yes	
454	3/4" Threaded Elbow 90	SMA/George Fischer	Yes	ea	5.00	Yes	Fair	Yes	
455	2" Elbow 90 Straight	SMA/George Fischer	Yes	ea	9.00	Yes	Fair	Yes	
456	1" Elbow 90 Straight	SMA/George Fischer	Yes	ea	25.00	Yes	Fair	Yes	
457	2" End Cap	SMA/George Fischer	Yes	ea	26.00	Yes	Fair	Yes	
458	1" End Cap	SMA/George Fischer	Yes	ea	19.00	Yes	Fair	Yes	
459	2" Hex Nipple	SMA/George Fischer	Yes	ea	5.00	Yes	Fair	Yes	
460	1.5" Hex Nipple	SMA/George Fischer	Yes	ea	20.00	Yes	Fair	Yes	
461	1" Hex Nipple	SMA/George Fischer	Yes	ea	9.00	Yes	Fair	Yes	
462	1/2" Hex Nipple	SMA/George Fischer	Yes	ea	21.00	Yes	Fair	Yes	
463	3/4" Hex Nipple	SMA/George Fischer	Yes	ea	31.00	Yes	Fair	Yes	
464	TEE Threaded 2"	SMA/George Fischer	Yes	ea	29.00	Yes	Fair	Yes	

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model# /Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
465	TEE Threaded 1.5"	SMA/George Fischer	Yes	ea	7.00	Yes	Fair	Yes	Cleaning, repair and insulating are required.
466	TEE Threaded 1"	SMA/George Fischer	Yes	ea	50.00	Yes	Fair	Yes	
467	TEE Threaded 3/4"	SMA/George Fischer	Yes	ea	24.00	Yes	Fair	Yes	
468	TEE Threaded 2 x 1"	SMA/George Fischer	Yes	ea	47.00	Yes	Fair	Yes	
469	TEE Threaded 1 x 3/4"	SMA/George Fischer	Yes	ea	14.00	Yes	Fair	Yes	
470	Threaded reducer 2x1"	SMA/George Fischer	Yes	ea	100.00	Yes	Fair	Yes	
471	Threaded reducer 1.5" x 3/4"	SMA/George Fischer	Yes	ea	6.00	Yes	Fair	Yes	
472	Union 2"	SMA/George Fischer	Yes	ea	34.00	Yes	Fair	Yes	
473	Union 1.5"	SMA/George Fischer	Yes	ea	6.00	Yes	Fair	Yes	
474	Union 1"	SMA/George Fischer	Yes	ea	46.00	Yes	Fair	Yes	
475	Union 3/4"	SMA/George Fischer	Yes	ea	69.00	Yes	Fair	Yes	
476	Union 1/2"	SMA/George Fischer	Yes	ea	24.00	Yes	Fair	Yes	
477	1" Threaded SCH40 5cm nipple	SMA	Yes	ea	29.00	Yes	Fair	Yes	
478	3/4" Threaded SCH40 5cm nipple	SMA	Yes	ea	75.00	Yes	Fair	Yes	
479	2" Threaded SCH40 8cm nipple	SMA	Yes	ea	11.00	Yes	Fair	Yes	
480	2" Threaded SCH40 10cm nipple	SMA	Yes	ea	26.00	Yes	Fair	Yes	
481	Air Valve Elbow Spool (with two flanges) DN80 PN16	SMA	Yes	ea	6.00	Yes	Good	Yes	
482	Air Valve Elbow Spool (with two flanges) DN80 PN25/40	SMA	Yes	ea	2.00	Yes	Good	Yes	
483	Air Valve Elbow Spool (with two flanges) DN50 PN16	SMA	Yes	ea	9.00	Yes	Good	Yes	

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484	Spools for Schools Reservoir Vault DN250/300 PN16	SMA	Yes	ea	5.00	Yes	Good	Yes	
485	Pipe With welded Flange (one) DN50 PN16	SMA	Yes	ea	15.00	Yes	Good	Yes	
486	Pipe With welded Flange (one) DN80 PN16	SMA	Yes	ea	15.00	Yes	Good	Yes	
487	Pipe With welded Flange (one) DN100 PN16	SMA	Yes	ea	9.00	Yes	Good	Yes	
488	Pipe With welded Flange (one) DN150 PN16	SMA	Yes	ea	2.00	Yes	Good	Yes	
489	Chamber Vent Spools DN100 PN6	SMA	Yes	ea	30.00	Yes	Good	Yes	
490	Chamber Vent Spools DN100 PN6	SMA	Yes	ea	18.00	Yes	Good	Yes	
491	Chamber Vent Spools DN100 PN6	SMA	Yes	ea	25.00	Yes	Good	Yes	
492	4" Elbow 180 & Flange	SMA	Yes	ea	7.00	Yes	Good	Yes	
493	12" Mitered Bend Fabricated Elbow - Cement lining	SMA	Yes	ea	15.00	Yes	Good	Yes	
494	12" Mitered Bend Fabricated Elbow - without Cement lining	SMA	Yes	ea	7.00	Yes	Good	Yes	
495	3" Mitered Bend Fabricated Elbow - Cement lining	SMA	Yes	ea	8.00	Yes	Good	Yes	
496	3" Mitered Bend Fabricated Elbow - without Cement lining	SMA	Yes	ea	28.00	Yes	Good	Yes	
497	4" Mitered Bend Fabricated Elbow - Cement lining	SMA	Yes	ea	5.00	Yes	Good	Yes	
498	4" Mitered Bend Fabricated Elbow - without Cement lining	SMA	Yes	ea	20.00	Yes	Good	Yes	
499	6" Mitered Bend Fabricated Elbow - Cement lining	SMA	Yes	ea	9.00	Yes	Good	Yes	
500	8" Mitered Bend Fabricated Elbow - Cement lining	SMA	Yes	ea	10.00	Yes	Good	Yes	
501	10" Mitered Bend Fabricated Elbow - Cement lining	SMA	Yes	ea	17.00	Yes	Good	Yes	

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502	16" Wall sleeve (pipe with puddle flange)	SMA	Yes	ea	13.00	Yes	Good	Yes	
503	10" Wall sleeve (pipe with puddle flange)	SMA	Yes	ea	3.00	Yes	Good	Yes	
504	4" Wall sleeve (pipe with puddle flange)	SMA	Yes	ea	4.00	Yes	Good	Yes	
505	8" Wall sleeve (pipe with puddle flange)	SMA	Yes	ea	6.00	Yes	Good	Yes	
506	6" Wall sleeve (pipe with puddle flange)	SMA	Yes	ea	10.00	Yes	Good	Yes	
507	10" Fabricated not welded sleeve (pipe with puddle flange)	SMA	Yes	ea	7.00	Yes	Good	Yes	
508	8" Fabricated not welded sleeve (pipe with puddle flange)	SMA	Yes	ea	9.00	Yes	Good	Yes	
509	Puddle Flange 8mm x 75mm Height 24"	SMA	Yes	ea	2.00	Yes	Fair	Yes	Sand Blasting is required
510	Puddle Flange 8mm x 75mm Height 16"	SMA	Yes	ea	16.00	Yes	Fair	Yes	Sand Blasting is required
511	Puddle Flange 8mm x 75mm Height 12"	SMA	Yes	ea	46.00	Yes	Fair	Yes	Sand Blasting is required
512	Puddle Flange 8mm x 75mm Height 6"	SMA	Yes	ea	21.00	Yes	Fair	Yes	Sand Blasting is required
513	Puddle Flange 8mm x 75mm Height 8"	SMA	Yes	ea	30.00	Yes	Fair	Yes	Sand Blasting is required
514	Puddle Flange 8mm x 75mm Height 10"	SMA	Yes	ea	14.00	Yes	Fair	Yes	Sand Blasting is required
515	Puddle Flange 8mm x 75mm Height 2"	SMA	Yes	ea	46.00	Yes	Fair	Yes	Sand Blasting is required
516	Puddle Flange 8mm x 75mm Height 3"	SMA	Yes	ea	49.00	Yes	Fair	Yes	Sand Blasting is required
517	Puddle Flange 8mm x 75mm Height 4"	SMA	Yes	ea	23.00	Yes	Fair	Yes	Sand Blasting is required
518	Puddle Flange 8mm x 75mm Height 6"	SMA	Yes	ea	83.00	Yes	Fair	Yes	Sand Blasting is required
519	Steel flanges DN200 PN16	SMA	Yes	ea	7.00	Yes	Fair	Yes	Sand Blasting is required
520	Steel flanges DN150 PN16	SMA	Yes	ea	4.00	Yes	Fair	Yes	Sand Blasting is required

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521	Steel flanges DN50 PN16	SMA	Yes	ea	5.00	Yes	Fair	Yes	Sand Blasting is required
522	HDPE End Cap 75mm	SMA	No	ea	7.00	No	-	-	-
523	HDPE Coupler 75mm	SMA	No	ea	13.00	No	-	-	-
524	HDPE Tee 75mm	SMA	No	ea	11.00	No	-	-	-
525	40 MM Handrails Sch 40 - Khallet Saleem	Al-Rayyan Industrial Smithy and Lathing	Yes	lm	84.00	Yes	Good	Yes	-
526	Cast In-Situ Chambers' Ladders (Aluminum)	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	1.00	Yes	Good	Yes	-
527	Level Indicators for Beit Emra	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	1.00	Yes	Good	Yes	-
528	Level Indicators for Schools	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	1.00	Yes	Good	Yes	-
529	Level Indicators for Khallet Saleem	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	1.00	Yes	Good	Yes	-
530	Reservoir Vents, 200mm - Khallet Saleem	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	2.00	Yes	Good	Yes	-
531	Steel Hanger 6" (HDG) - Beit Emra	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	12.00	Yes	Good	Yes	-
532	SS 316 Pipe 12" SCH40 - Khallet Saleem	SMA	Yes	LM	13.25	Yes	Good	Yes	-
533	SS 316 Pipe 6" SCH40 - Beit Emra	SMA	Yes	LM	9.70	Yes	Good	Yes	-
534	SS 316 Pipe 8" SCH40 - Khallet Saleem	SMA	Yes	LM	8.20	Yes	Good	Yes	-

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535	SS316 TEE 12" - Khallet Saleem	SMA	Yes	ea	1.00	Yes	Good	Yes	-
536	Elbow 90 SS316 SCH40 6" - Beit Emra	SMA	Yes	ea	5.00	Yes	Good	Yes	-
537	Elbow 90 SS316 SCH40 8" - Khallet Saleem	SMA	Yes	ea	1.00	Yes	Good	Yes	-
538	Red. SS316 12" x 6" - Beit Emra	SMA	Yes	ea	1.00	Yes	Good	Yes	-
539	Red. SS316 12" x 8" - Beit Emra	SMA	Yes	ea	1.00	Yes	Good	Yes	-
540	Blind Flange PN16" 3" For Altitude Valves SS316 - Schools	SMA	Yes	ea	1.00	Yes	Good	Yes	-
541	Blind Flange PN16" 3" For Altitude Valves SS316 - Khallet Saleem	SMA	Yes	ea	1.00	Yes	Good	Yes	-
542	SS316 PN16 FLANGE 6" - Beit Emra	SMA	Yes	ea	2.00	Yes	Good	Yes	-
543	SS316 PN16 FLANGE 8" - Schools	SMA	Yes	ea	1.00	Yes	Good	Yes	-
544	SS316 PN16 FLANGE 8" - Khallet Saleem	SMA	Yes	ea	1.00	Yes	Good	Yes	-
545	SS316 PN16 FLANGE 12" - Khallet Saleem	SMA	Yes	ea	1.00	Yes	Good	Yes	-
546	Jack support 2" hot dip galvanized - 85cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	18.00	Yes	Good	Yes	-
547	Jack support 2" hot dip galvanized - 80cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	38.00	Yes	Fair	Yes	Will need assemble and repair
548	Jack support 2" hot dip galvanized - 50cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	57.00	Yes	Fair	Yes	Will need assemble and repair
549	Jack support 2" hot dip galvanized - 45cm height	Al-Rayyan Industrial Smithy	Yes	ea	19.00	Yes	Fair	Yes	Will need assemble and repair

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		and Lathing							
550	Jack support 2" hot dip galvanized - 25cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	2.00	Yes	Fair	Yes	Will need assemble and repair
551	Jack support 2" hot dip galvanized - 45cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	21.00	Yes	Fair	Yes	Will need assemble and repair
552	Jack support 2" hot dip galvanized - 38cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	50.00	Yes	Fair	Yes	Will need assemble and repair
553	Jack support 3" with 1.25" ROD hot dip galvanized - 50cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	50.00	Yes	Fair	Yes	Will need assemble and repair
554	Jack support 3" with 1.25" ROD hot dip galvanized - 48cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	7.00	Yes	Fair	Yes	Will need assemble and repair
555	Jack support 3" with 1.25" ROD hot dip galvanized - 45cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	9.00	Yes	Fair	Yes	Will need assemble and repair
556	Jack support 3" with 1.25" ROD hot dip galvanized - 40cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	25.00	Yes	Fair	Yes	Will need assemble and repair
557	Jack support 3" with 1.25" ROD hot dip galvanized - 35cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	26.00	Yes	Fair	Yes	Will need assemble and repair
558	Jack support 3" with 1.25" ROD hot dip galvanized - 50cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	10.00	Yes	Fair	Yes	Will need assemble and repair

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559	Jack support 3" with 1.25" ROD hot dip galvanized - 48cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	7.00	Yes	Fair	Yes	Will need assemble and repair
560	Jack support 3" with 1.25" ROD hot dip galvanized - 45cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	13.00	Yes	Fair	Yes	Will need assemble and repair
561	Jack support 3" with 1.25" ROD hot dip galvanized - 40cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	2.00	Yes	Fair	Yes	Will need assemble and repair
562	Jack support 3" with 1.25" ROD hot dip galvanized - 30cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	2.00	Yes	Fair	Yes	Will need assemble and repair
563	Jack support 3" with 1.25" ROD hot dip galvanized - 27cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	11.00	Yes	Fair	Yes	Will need assemble and repair
564	Jack support 3" with 1.25" ROD hot dip galvanized - 20cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	8.00	Yes	Fair	Yes	Will need assemble and repair
565	Jack support 3" with 1.25" ROD hot dip galvanized - 50cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	49.00	Yes	Fair	Yes	Will need assemble and repair
566	Jack support 3" with 1.25" ROD hot dip galvanized - 48cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	2.00	Yes	Fair	Yes	Will need assemble and repair
567	Jack support 3" with 1.25" ROD hot dip galvanized - 40cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	3.00	Yes	Fair	Yes	Will need assemble and repair
568	Jack support 3" with 1.5" ROD hot dip galvanized - 55cm height	Al-Rayyan Industrial Smithy	Yes	ea	1.00	Yes	Fair	Yes	Will need assemble and repair

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		and Lathing							
569	Jack support 3" with 1.5" ROD hot dip galvanized - 50cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	2.00	Yes	Fair	Yes	Will need assemble and repair
570	Jack support 3" with 1.5" ROD hot dip galvanized - 48cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	3.00	Yes	Fair	Yes	Will need assemble and repair
571	Jack support 3" with 1.5" ROD hot dip galvanized - 45cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	4.00	Yes	Fair	Yes	Will need assemble and repair
572	Jack support 3" with 1.5" ROD hot dip galvanized - 40cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	18.00	Yes	Fair	Yes	Will need assemble and repair
573	Jack support 3" with 1.5" ROD hot dip galvanized - 37cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	19.00	Yes	Fair	Yes	Will need assemble and repair
574	Jack support 3" with 1.5" ROD hot dip galvanized - 35cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	14.00	Yes	Fair	Yes	Will need assemble and repair
575	Jack support 3" with 1.5" ROD hot dip galvanized - 27cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	4.00	Yes	Fair	Yes	Will need assemble and repair
576	Jack support 3" with 1.5" ROD hot dip galvanized - 22cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	1.00	Yes	Fair	Yes	Will need assemble and repair
577	Jack support 3" with 1.5" ROD hot dip galvanized - 18cm height	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	1.00	Yes	Fair	Yes	Will need assemble and repair

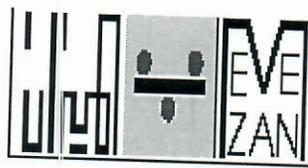
No.	Item Description	Brand/Model/ Model# /Manufacturer	Brand/Model/ Model/ Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
578	Steel plate for pipe support	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	375.00	Yes	Good	Yes	Will need assemble and repair
579	Pipe supprt saddle	Al-Rayyan Industrial Smithy and Lathing	Yes	ea	80.00	Yes	Good	Yes	Will need assemble and repair
580	Rendroc FC	FOSROC	Yes	Bag	51.00	Yes	Bad	No	Expired
581	Rendroc HF	FOSROC	Yes	Bag	28.00	Yes	Bad	No	Expired
582	Rendroc Hsxtra	FOSROC	Yes	Bag	1.00	Yes	Bad	No	Expired
583	Rendroc Plug	FOSROC	Yes	Drum	14.00	Yes	Bad	No	Expired
584	Conplast SP430	FOSROC	Yes	Drum	13.00	Yes	Bad	No	Expired
585	Conplast SP430	FOSROC	Yes	Drum	24.00	Yes	Bad	No	Expired
586	Nitobond SBR 201 25 litre	FOSROC	Yes	Drum	1.00	Yes	Bad	No	Expired
587	Nitocote EPSW Grey	FOSROC	Yes	Drum	10.00	Yes	Bad	No	Expired
588	Nitocote EP405 Blue	FOSROC	Yes	Drum	2.00	Yes	Bad	No	Expired
589	Nitocote EP405 White	FOSROC	Yes	Drum	12.00	Yes	Bad	No	Expired
590	Nito Marter TC 2000	FOSROC	Yes	Drum	3.00	Yes	Bad	No	Expired
591	Theoflix 600 - 2.5 litre	FOSROC	Yes	Drum	36.00	Yes	Bad	No	Expired
592	Niroprime Zincrich	FOSROC	Yes	Drum	1.00	Yes	Bad	No	Expired
593	Concure WB 309	FOSROC	Yes	Drum	1.00	Yes	Bad	No	Expired
594	Water Stop 15 cm width	FOSROC	Yes	Roll	9.00	Yes	Bad	No	-
595	Water Stop 25 cm width	FOSROC	Yes	Roll	3.00	Yes	Bad	No	-
596	Water Stop for manholes - 5 m length	FOSROC	Yes	Roll	7.00	Yes	Bad	No	-
597	Nitobond AR 5 litre	FOSROC	Yes	Drum	1.50	Yes	Bad	No	Expired
598	Super palstsizer SP430 25 litre	FOSROC	Yes	Drum	6.00	Yes	Bad	No	Expired
599	Shrinkable sheets 10 cm	ABC	Yes	Roll	24.00	Yes	Bad	No	-
600	Shrinkable sheets 5 cm	ABC	Yes	Roll	38.00	Yes	Bad	No	-
601	Shrinkable sheets	ABC	Yes	Roll	22.00	Yes	Bad	No	-
602	Warning tape	ABC	Yes	Roll	6.00	Yes	Bad	No	-
603	Plastic spacers	ABC	Yes	Each	1,640.00	Yes	Bad	No	-
604	Plastic cones	ABC	Yes	Each	770.00	Yes	Bad	No	-

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605	Tie rod 20cm	ABC	Yes	Rod	1,522.00	Yes	Bad	No	-
606	Tie rod 25cm	ABC	Yes	Rod	1,550.00	Yes	Bad	No	-
607	8mm tie rod spacer	ABC	Yes	Each	802.00	Yes	Bad	No	-
608	16mm tie rod spacer	ABC	Yes	Each	1,889.00	Yes	Bad	No	-
609	Geotextile 3.81*109.73 (13 Rolls)	ABC	Yes	M2	5,434.93	Yes	Bad	No	-
610	Geotextile 1.905*109.73 (27 Rolls)	ABC	Yes	M2	5,643.96	Yes	Bad	No	-
611	Geotextile 1.905*91.44 (1 Roll)	ABC	Yes	M2	174.19	Yes	Bad	No	-
612	Geotextile 0.95*109.73 (7 Roll)	ABC	Yes	M2	729.70	Yes	Bad	No	-
613	Geotextile 1.28*109.73 (3 Rolls)	ABC	Yes	M2	421.36	Yes	Bad	No	-
614	Geotextile 1.26*109.73 (1 Roll)	ABC	Yes	M2	138.26	Yes	Bad	No	-
615	Geotextile 1.25*109.73 (1 Roll)	ABC	Yes	M2	137.16	Yes	Bad	No	-
616	Geotextile 0.88*55 (1 Roll)	ABC	Yes	M2	48.40	Yes	Bad	No	-
617	Geotextile 1.43*50 (1 Roll)	ABC	Yes	M2	71.50	Yes	Bad	No	-
618	Geotextile 0.88*40 (1 Roll)	ABC	Yes	M2	35.20	Yes	Bad	No	-
619	Plastic chamfer	ABC	Yes	LM	300.00	Yes	Bad	No	-
620	20 mm plastic pipes	ABC	-	Each	25.00	Yes	-	-	-
621	Galvanised steel pipes PVC coated 12*6 1.5"	ABC	-	LM	72.00	No	-	-	-
622	Shrinkable sheets 45 cm	ABC	Yes	Roll	22.00	Yes	Bad	No	-
623	Perforated pipes	ABC	Yes	LM	100.00	Yes	Fair	Yes	-
624	Unispeed coating - RED	ABC/Nirlat	Yes	Liters	161.00	Yes	-	No	Expired
625	Unispeed coating - White	ABC/Nirlat	Yes	Liters	135.00	Yes	-	No	Expired
626	EpoxyKOL coating (NIRLAT) - WHITE	ABC/Nirlat	Yes	Liters	18.00	Yes	-	No	Expired
627	EpoxyKOL coating (NIRLAT) - Blue	ABC/Nirlat	Yes	Liters	90.00	Yes	-	No	Expired
628	Unispeed coating - Blue	ABC/Nirlat	Yes	Liters	18.00	Yes	-	No	Expired
629	EPOXYKOL (NIRLAT) Hardener	ABC/Nirlat	Yes	Liters	90.00	Yes	-	No	Expired

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630	Unispeed coating - Hardener	ABC/Nirlat	Yes	Liters	61.00	Yes	-	No	Expired
631	Vault Access Hatch	ABC/Keyroc	Yes	ea	1.00	Yes	Good	Yes	-
632	Steel Reinforcement (cut and bend)	Al Rayyan	Yes	Ton	9.00	Yes	Bad	No	Full of Rust
633	600mm Manhole Covers & Frames - for urban washout	SMA/Hydrotech	Yes	ea	11.00	Yes	Good	Yes	-
634	800mm Manhole Covers & Frames - for Manholes 200mm and above	SMA/Hydrotech	Yes	ea	5.00	Yes	Good	Yes	-
635	800mm Manhole Covers & Frames - for Manholes 200mm and above	SMA/Hydrotech	Yes	ea	8.00	Yes	Good	Yes	-
636	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
637	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
638	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
639	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
640	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
641	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
642	700mm Manhole Covers & Frames - for Manholes	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-

No.	Item Description	Brand/Model/Model# /Manufacturer	Brand/Model/Model# /Manufacturer (Matching Check) (Yes, No)	Unit	Quantity	Quantity (Matching Check) (Yes, No)	Condition Check (Good, Fair, Bad)	Can be used for the project (Yes, No)	Comments
	150mm and less and urban washout								
643	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
644	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
645	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
646	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
647	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
648	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-
649	700mm Manhole Covers & Frames - for Manholes 150mm and less and urban washout	SMA/Hydrotech	Yes	ea	10.00	Yes	Good	Yes	-

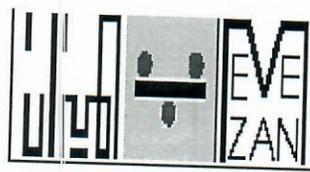
## APPENDIX 2: CORE ASPHALT TEST RESULTS- THICKNESS AND DEGREE OF COMPACTION



## TEST REPORT ON ASPHALT CORE TEST

Report No. : 0807/0821	Date : 15/08/2021
Project Name : مشروع شبكة مياه يطا-الخليل	Manufacture : مصنع الامل للاسفلت
Project Owner : المجموعة العالمية للاستشارات الهندسية	Sample Source : عدة طرق في يطا
Contractor : ****	Place Of Receiving Sample: منطقة يطا
Consultant : م. اسامة شاهين -	Sampling Date : 11/08/2021
Test Requested By : م. اسامة شاهين	Testing Date : 12/08/2021
Sample Taken By : م. أحمد بعاة	Type of Mix : 3/4"
Reference standard : AASHTO-T-130	
Method Of Sample Keeping in Lab : ضمن الظروف المعيارية المطلوبة للعينات	





Sample No.	Street Name Or No.	Thickness (cm)	Volume (cm <sup>3</sup> )	Density (gm/cm <sup>3</sup> )	Marshall Density (gm/cm <sup>3</sup> )	Compaction Degree (%)
1	اعمال فحص طرق في يطا - الخليل	4.4	274.20	2.298	2.344	98.1
2		4.6	312.00	2.322	2.344	99.1
3		5	357.80	2.294	2.344	97.9
4		4	273.70	2.324	2.344	99.2
5		6.8	445.00	2.292	2.344	97.8
6		7.9	529.00	2.296	2.344	97.9
7		5	333.30	2.285	2.344	97.5
8		6.5	425.80	2.298	2.344	98.0
9		6.2	428.10	2.292	2.344	97.8
10		7.1	374.70	2.295	2.344	97.9
11		5	338.40	2.301	2.344	98.2
12		7.3	451.20	2.322	2.344	99.1
13		5.8	375.10	2.331	2.344	99.4
14		4.5	297.30	2.308	2.344	98.5
15		5.7	351.00	2.291	2.344	97.7
16		5.2	359.80	2.316	2.344	98.8
17		8.3	578.90	2.283	2.344	97.4
18		4.8	346.40	2.318	2.344	98.9
19		5.1	358.20	2.320	2.344	99.0
20		6.6	416.30	2.318	2.344	98.9
21		8.5	532.20	2.282	2.343	97.4
22		7.5	410.50	2.313	2.343	98.7

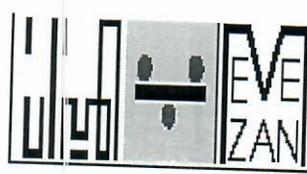
شركة مختبر الميزان للاعمال الهندسية - نابلس - رفديا - بجانب مستشفى رفديا الحكومي - هاتف 092344542

صفحة 2 من 3

الاصدار الاول - 2019\10

نموذج رقم 21





23	4.7	229.60	2.335	2.343	99.7
24	8.9	598.50	2.284	2.343	97.5
25	4.2	182.70	2.304	2.343	98.3
26	6.1	366.10	2.314	2.343	98.7
27	11.1	730.30	2.272	2.343	97.0
28	6.5	410.70	2.298	2.343	98.1
29	9.1	571.10	2.296	2.343	98.0
30	8.2	521.10	2.313	2.343	98.7

المعلومات إن أعطيت الرمز (*) تعني أنها مزودة للمختبر من قبل الزبون
النتائج إن أعطيت الرمز (1) تعني أن الفحص تم إجراؤه لدى متعهد فرعي
النتائج إن أعطيت (2) تعني أن الفحص غير معتمد من قبل وحدة اعتماد المختبرات

**Notes:**

- 1- The results above are related to tested samples only.
- 2- It is prohibited to reproduce this report without written permission from MTC.

**Technical Manager**

**Director**

**ENG. DIYAA SHAKHSHEER**

**DR. ABDULNASIR SHAKHSHEER**

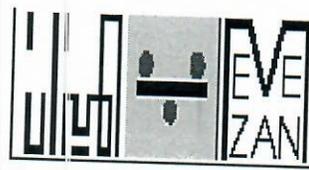


شركة مختبر الميزان للأعمال الهندسية - نابلس - ريفديا - بجانب مستشفى ريفديا الحكومي - هاتف 092344542

صفحة 3 من 3

الإصدار الأول-2019\10

نموذج رقم 21



## REPORT ON FRESH ASPHALT MARSHAL TEST

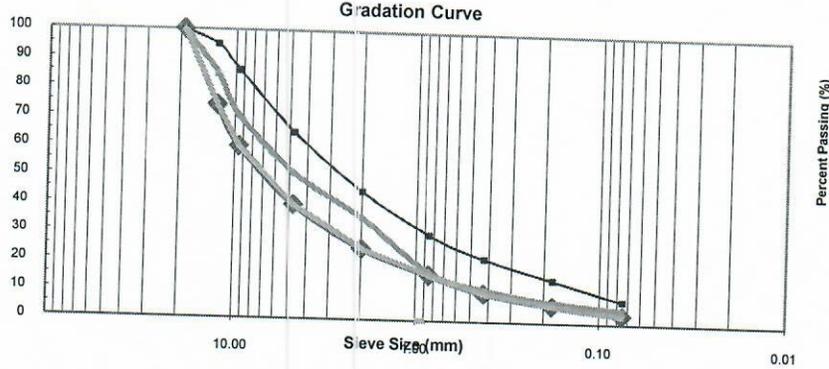
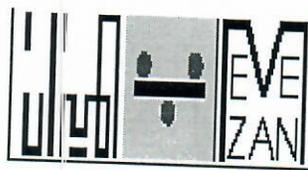
Report No. : MTC:0806/0821	Date : 2021/08/10
Project Name : مشروع شبكة مياه يطا	Manufacture : مصنع الامل للاسفلت
Project Owner : المجموعة العالمية للاستشارات الهندسية	Sample Source : شارع رئيسي عينة رقم 2
Contacteur : ****	Place Of Receiving Sample:
Consultant : م. اسامة شاهين	Sampling Date : 2021/08/04
Test Requested By : م. اسامة شاهين	Testing Date : 2021/08/04
Sample Taken By : م. ايوب ميادمة	Type of Mix : * 3/4
Station : ققرب البلدة القديمة	Reference Standard : ASTM
Method Of Sample Keeping in Lab: في مكان جاف وآمن	

### Test Result

#### 1- Gradation -see curve 1 – ASTM 136

Sieve No.	# 3/4	# 1/2	# 3/8	# 4	#10	# 20	# 40	# 80	# 200
Sieve size (mm)	19.00	12.50	9.50	4.75	2.00	0.85	0.43	0.18	0.075
Passing %	100.00	84.82	70.43	51.02	35.74	17.00	11.24	7.22	4.90
Specif'ns.	100	74-95	60-86	40-65	25-45	16-30	10-22	6-15	3-8
Toleran.	± 5	± 5	± 5	± 4	± 4	± 4	± 4	± 4	± 1.0





No.	Type of test	Unit	Standard	Result	Specification limit
2	Extraction test (bitumen content)	%	ASTM D2172 & ASTM D2726	4.80	4.0-6.0
3	Marshall test(density)	%		2.344	
4	Air Voids	%		4.78	4-6
5	Percent of Voids in Mineral Agg.- VMA	%		13.5	13 MIN
6	Voids filled with asphalt VFA	%		64.6	65-75
7	Stability	kg		1650	1000 MIN
8	Loss of Stability	%		15.40	25 MAX
9	Stiffness	Kg/mm		628	500 MIN
10	Flow	mm		2.63	2.0-3.5

المعلومات إن أعطيت الرمز (\*) تعني أنها مزودة للمختبر من قبل الزبون  
النتائج إن أعطيت الرمز (1) تعني أن الفحص تم إجراؤه لدى متعهد فرعي  
النتائج إن أعطيت (2) تعني أن الفحص غير معتمد من قبل وحدة اعتماد المختبرات

**Notes:**

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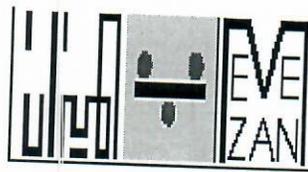
**Technical Manager**

ENG. DIYA SHAKHSHEER



**Director**

DR.ABDULNASIR SHAKHSHER



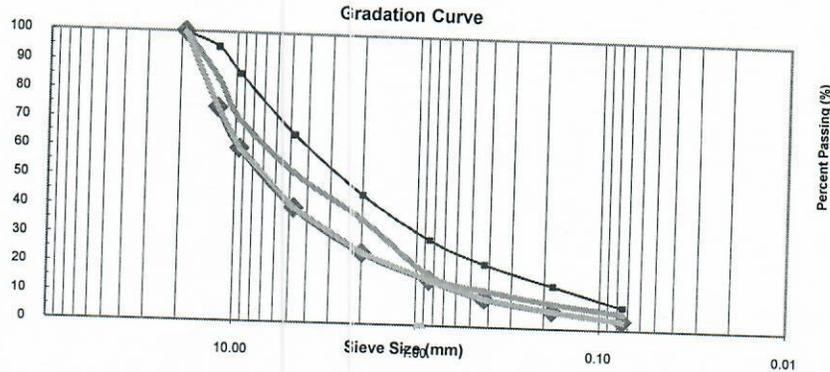
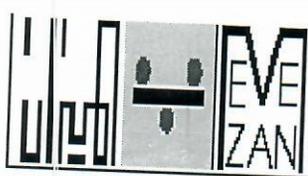
## REPORT ON FRESH ASPHALT MARSHAL TEST

Report No. : MTC:0805/0821	Date : 2021/08/09
Project Name : مشروع شبكة مياه يطا	Manufacture : مصنع الامل للاسفلت
Project Owner : المجموعة العالمية للاستشارات الهندسية	Sample Source : قرب خزان بيت عمره
Contacteur : ****	Place Of Receiving Sample:
Consultant : م. اسامة شاهين	Sampling Date : 2021/08/04
Test Requested By : م. اسامة شاهين	Testing Date : 2021/08/04
Sample Taken By : م. ايوب ميادمة	Type of Mix : * 3/4
Station : قرب خزان بيت عمره	Reference Standard : ASTM
Method Of Sample Keeping in Lab: في مكان جاف وآمن	

### Test Result

1- Gradation -see curve 1 – ASTM 136									
Sieve No.	# 3/4	# 1/2	# 3/8	# 4	#10	# 20	# 40	# 80	# 200
Sieve size (mm)	19.00	12.50	9.50	4.75	2.00	0.85	0.43	0.18	0.075
Passing %	100.00	84.33	69.84	51.85	36.66	17.78	12.89	8.89	5.70
Specifns.	100	74-95	60-86	40-65	25-45	16-30	10-22	6-15	3-8
Toleran.	± 5	± 5	± 5	± 4	± 4	± 4	± 4	± 4	± 1.0





No.	Type of test	Unit	Standard	Result	Specification limit
2	Extraction test (bitumen content)	%	ASTM D2172 & ASTM D2726	4.75	4.0-6.0
3	Marshall test(density)	%		2.343	
4	Air Voids	%		4.80	4-6
5	Percent of Voids in Mineral Agg.- VMA	%		13.57	13 MIN
6	Voids filled with asphalt VFA	%		64.64	65-75
7	Stability	kg		1616	1000 MIN
8	Loss of Stability	%		16.05	25 MAX
9	Stiffness	Kg/mm		616	500 MIN
10	Flow	mm		2.63	2.0-3.5

المعلومات إن أعطيت الرمز (\*) تعني أنها مزودة للمختبر من قبل الزبون  
النتائج إن أعطيت الرمز (1) تعني أن الفحص تم إجراؤه لدى متعهد فرعي  
النتائج إن أعطيت (2) تعني أن الفحص غير معتمد من قبل وحدة اعتماد المختبرات

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**Technical Manager**

ENG. DIYA SHAKHSHEER

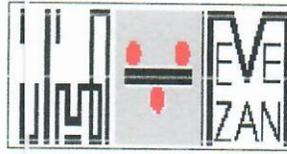


**Director**

DR.ABDULNASIR SHAKHSHER



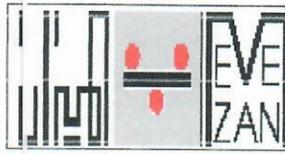
## APPENDIX 3: CORE TEST RESULTS FOR CONCRETE CHAMBERS- COMPRESSIVE STRENGTH



## REPORT OF CONCRETE CORE TEST

Report No. : 811/0821	Date : 2021/08/17
Project Name : مشروع شبكة مياه يطا - الخليل	Manufacture : ----
Project Owner : المجموعة العالمية للاستشارات الهندسية	Sample Source : جدران خزانات مياه + مناهل
Contractor : -----	Place Of Receiving Sample: يطا
Consultant : المجموعة العالمية للاستشارات الهندسية	Date of Casting : 2018/10/17
Test Requested By : م. أسامة شاهين	Date of Drilling : 2021/08/04
Age of Concrete : more than 28 days	Date of Testing : 2021/08/06
Sample Taken By : م. أحمد بعا ره + م. أيوب ميادمه	Type of Concrete : 400 kg/cm <sup>2</sup>
Reference standard : PS55 -2019	
Method Of Sample Keeping in Lab : ضمن الظروف المعيارية المطلوبة	

Sample No.	Diameter (cm)	Area (cm <sup>2</sup> )	Uncapped Length (cm)	capped Length (cm)	Density Kg/m <sup>3</sup>	Failure Load (KN)	F Equi.	Equivalent Compressive Cube Strength	
								MPa	Kg/cm <sup>2</sup>
1	9.30	67.93	10.10	10.70	2.328	243.0	1.306	46.7	477.0
2			9.80	10.40	2.371	286.0	1.299	54.69	557.5
3			10.00	10.60	2.332	235.0	1.306	45.10	460.5
4			9.90	10.50	2.348	281.0	1.303	53.90	549.4
5			10.20	10.80	2.399	271.0	1.314	52.40	534.3
6			9.90	10.50	2.340	294.0	1.303	56.40	574.8
7			9.90	10.50	2.348	274.0	1.303	52.56	535.7
8			10.0	10.6	2.330	285.0	1.305	54.75	558.0
9			10.1	10.70	2.320	267.0	1.310	51.49	524.0
10			10.40	11.00	2.360	251.0	1.321	48.81	497.6
11			10.10	10.70	2.314	248.0	1.310	47.83	487.5
12			10.00	10.60	2.333	272.0	1.305	52.26	532.6
13			10.20	10.80	2.300	258.0	1.313	49.87	508.0
14			10.20	10.80	2.296	274.0	1.313	52.96	539.0
15			10.00	10.60	2.329	266.0	1.306	51.14	521.0
16	9.30	67.93	10.10	10.70	2.315	281.0	1.310	54.19	552.4



17			10.30	10.90	2.295	277.0	1.317	53.70	547.4
18			10.00	10.60	2.336	287.0	1.306	55.18	562.0
19			10.40	11.00	2.276	294.0	1.321	57.12	583.0
20			10.20	10.80	2.305	281.0	1.313	54.31	553.0
21			9.90	10.50	2.340	255.0	1.303	48.91	498.0
22			10.10	10.70	2.307	267.0	1.310	51.49	525.0
23			10.30	10.90	2.275	269.0	1.295	51.28	523.0
24			10.50	11.10	2.267	290.0	1.324	56.52	576.0
25			9.80	10.40	2.349	284.0	1.298	54.27	553.0
26			10.10	10.70	2.308	249.0	1.310	48.00	489.0
27			10.20	10.80	2.298	258.0	1.313	49.8	508.0
28			10.20	10.80	2.282	279.0	1.313	53.93	549.7
29			10.30	10.90	2.287	288.0	1.317	55.89	569.0
30			10.50	11.00	2.253	277.0	1.324	53.99	550.0

المعلومات التي قام الزبون بتزويد المركز بها (\*)

فحص تم اجراؤه لدى متعهد فرعي ( 1 )

فحص غير معتمد من قبل وحدة اعتماد المختبرات ( 2 )

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**Technical Manager**

**Eng. Diya Shakhshir**

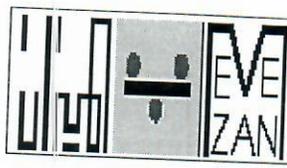


**Director**

**Dr. Abdul-Nasir Shakhshir**



## APPENDIX 4: SAMPLE TESTING OF EXISTING BASE COURSE AND BEDDING MATERIALS



## REPORT OF FIELD DENSITY TEST (Degree of Compaction)

Report No. : MTC : 0803/0821	Date : 2021/08/06
Project Name : مشروع شبكة مياه يطا	Manufacture :
Project Owner : شركة المجموعة العالمية للاستشارات الهندسية	Sample Source :
Contractor : ***	Place Of Receiving Sample: يطا / الخليل
Consultant : م. اسامة شاهين	Sampling Date : 2021-08-04
Test Requested By : م. اسامة شاهين	Testing Date : 2021-08-03
Sample Taken By : م. احمد بعاة	Type of Material : COMPACTED
Station : خزان عمره	Reference Standard: AASHTO-T 191-02

### Test Result

Sample No	Tested Area	Wet Density (g/cm <sup>3</sup> )	Moisture Content (%)	Dry Density (g/cm <sup>3</sup> )	Maximum Dry Density MDD (g/cm <sup>3</sup> )	Degree of Compaction (%)
1	خزان عمره	1.910	3.78	1.840	MTC : 803/0821	95.4%
2		1.903	3.69	1.835	1.930 gm/cm <sup>3</sup>	95.1%

- (\*) المعلومات التي قام الزبون بتزويد المركز بها  
(1) فحص تم اجراؤه لدى متعهد فرعي  
(2) فحص غير معتمد من قبل وحدة اعتماد المختبرات

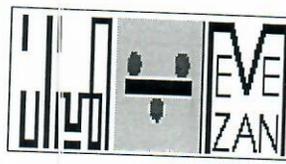
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Technical Manager  
Eng. Deya` Shakhshir



Director  
Eng. Abdelnaser Shakhshir



## REPORT OF FIELD DENSITY TEST (Degree of Compaction)

Report No. : MTC : 0804/0821	Date : 2021/08/06
Project Name : مشروع شبكة مياه يطا	Manufacture :
Project Owner : شركة المجموعة العالمية للاستشارات الهندسية	Sample Source :
Contractor : ***	Place Of Receiving Sample: يطا / الخليل
Consultant : م. اسامة شاهين	Sampling Date : 2021-08-04
Test Requested By : م. اسامة شاهين	Testing Date : 2021-08-03
Sample Taken By : م. احمد بعاة	Type of Material : COMPACTED
Station : خزان 5000 كوب + المدارس	Reference Standard: AASHTO-T 191-02

### Test Result

Sample No	Tested Area	Wet Density (g/cm <sup>3</sup> )	Moisture Content (%)	Dry Density (g/cm <sup>3</sup> )	Maximum Dry Density MDD (g/cm <sup>3</sup> )	Degree of Compaction (%)
1	خزان 5000 كوب	2.240	3.83	2.158	MTC : 804/0821 2.241 gm/cm3	96.3 %
2		2.319	7.3	2.243		100.1 %
3	خزان المدارس	2.326	3.87	2.239		100.0 %

(\*) المعلومات التي قام الزبون بتزويد المركز بها  
(1) فحص تم اجراؤه لدى متعهد فرعي  
(2) فحص غير معتمد من قبل وحدة اعتماد المختبرات

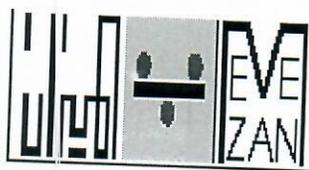
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Technical Manager  
Eng. Deya` Shakhshir



Director  
Eng. Abdelnaser Shakhshir



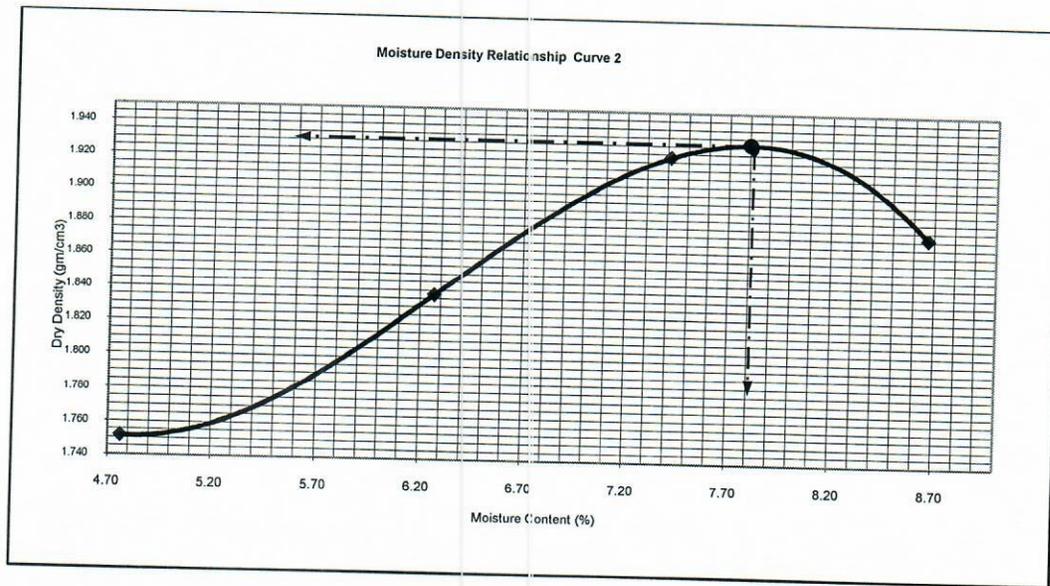
## TEST REPORT ON BASE COURSE MATERIAL

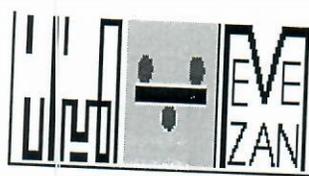
### Test Result

Report No. : MTC : 0803/0821	Date : 2021/08/06
Project Name : مشروع شبكة مياه يطا	Manufacture :
Project Owner : المجموعة العالمية للاستشارات الهندسية	Sample Source :
Contractor : ***	Place Of Receiving Sample: خزان بيت عمره
Consultant : م. اسامة شاهين	Sampling Date : 2021-08-03
Test Requested By : م. اسامة شاهين	Testing Date : 2021-08-04
Sample Taken By : م. ايوب ميادمة	Type of Material : COMPACTED
Station : خزان بيت عمره	Reference Standard: AASHTO + ASTM
Method Of Sample Keeping in Lab : في المختبر في مكان جاف وامن	

### Test Result

6	Optimum Moisture Content (O.M.C)	%	AASHTO T-180	7.800	-----	
7	Maximum Dry Density (M.D.D)	gm/cm <sup>3</sup>		1.930	2.1 Min.	See Curve 1





المعلومات إن أعطيت الرمز (*) تعني أنها مزودة للمختبر من قبل الزبون
النتائج إن أعطيت الرمز (1) تعني أن الفحص تم إجراؤه لدى متعهد فرعي
النتائج إن أعطيت (2) تعني أن الفحص غير معتمد من قبل وحدة اعتماد المختبرات

Notes:

1- It is prohibited to reproduce this report without written permission from MTC.

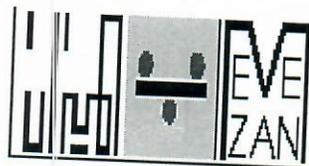
Technical Manager

Eng.Deya` Shakhshir

Director

Eng.Abdelnaser Shakhshir





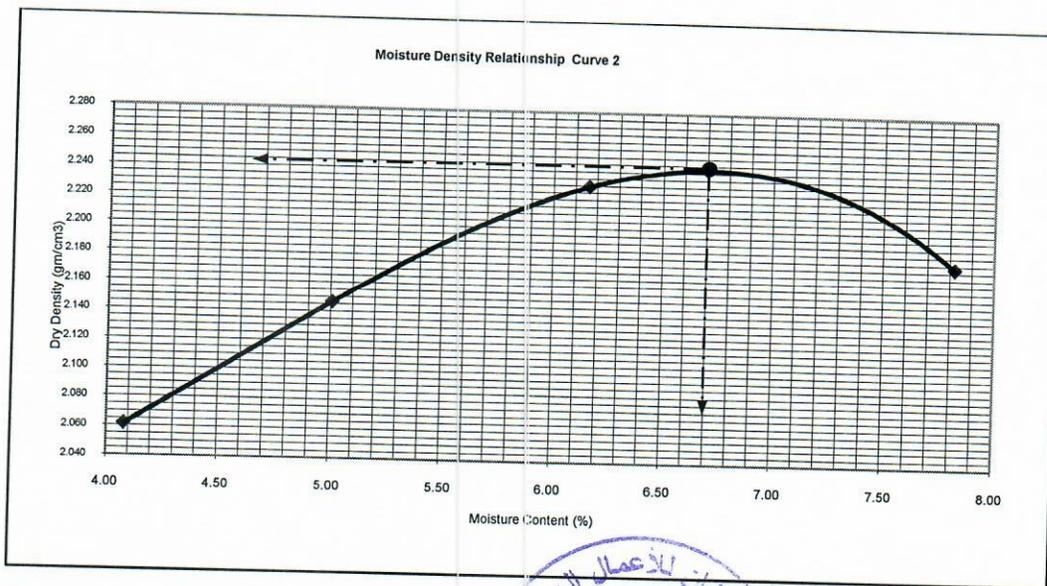
## TEST REPORT ON BASE COURSE MATERIAL

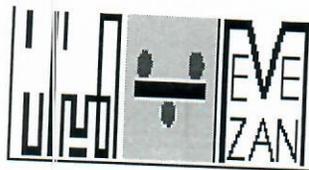
### Test Result

Report No. : MTC : 0804/0821	Date : 2021/08/06
Project Name : مشروع شبكة مياه يطا	Manufacture :
Project Owner : المجموعة العالمية للاستشارات الهندسية	Sample Source :
Contractor : ***	Place Of Receiving Sample: خزان 5000 كوب
Consultant : م. اسامة شاهين	Sampling Date : 2021-08-03
Test Requested By : م. اسامة شاهين	Testing Date : 2021-08-04
Sample Taken By : م. ايوب ميادمة	Type of Material : COMPACTED
Station : خزان 5000 كوب + المدارس	Reference Standard: AASHTO + ASTM
Method Of Sample Keeping in Lab : في المختبر في مكان جاف وامن	

### Test Result

6	Optimum Moisture Content (O.M.C)	%	AASHTO T-180	6.80	-----	
7	Maximum Dry Density (M.D.D)	gm/cm <sup>3</sup>		2.241	2.1 Min.	See Curve 1





المعلومات إن أعطيت الرمز (*) تعني أنها مزودة للمختبر من قبل الزبون
النتائج إن أعطيت الرمز (1) تعني أن الفحص تم إجراؤه لدى متعهد فرعي
النتائج إن أعطيت (2) تعني أن الفحص غير معتمد من قبل وحدة اعتماد المختبرات

Notes:

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Technical Manager

Eng.Deya` Shakhshir

Director

Eng.Abdelnaser Shakhshir



INSTITUTIONAL CONSULTANCY FOR CONDUCTING AN ASSESSMENT  
FOR THE COMPLETED AND NON-COMPLETED WORKS UNDER FOR  
YATTA WATER NETWORK PROJECT AS WELL AS A CAPACITY  
ASSESSMENT OF YATTA WATER DEPARTMENT



Kingdom of the Netherlands



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through UNICEF

Thank You